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From Competency to Capability

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Disclaimer

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Executive Summary

Problem

Nursing students may experience difficulty transitioning from being competent in the campus lab environment to being capable in a clinical environment when the campus lab experience does not offer realistic challenges. Errors that are made by nursing students during the medication administration process center on performance deficits as a prevalent cause (Wolf, Hicks, & Serembus, 2006). Students have the knowledge of how to safely perform the skills but cannot demonstrate the skills, utilizing clinical reasoning, in the unstable and unpredictable hospital environment. Traditional campus lab instruction for medication administration includes small group practice that is task oriented in a stable and predictable environment. Progressive simulation would challenge the student with utilization of multiple levels of simulation incorporating clinical reasoning.

Purpose

This capstone project evaluated the curriculum change of introducing progressive simulation involving an unstable and unpredictable environment in the campus lab.

Goal

The goal of this project was enabling the Associate Degree Nursing student to develop capability of medication administration in the unstable and unpredictable environment of the clinical setting.

Objectives

Upon completion of the progressive simulation, the student will report an increase in self-efficacy when compared to a baseline self-efficacy assessment prior to the intervention. The student, who has completed the progressive simulation practice and passed the check-off simulation, will demonstrate capability in the clinical environment by the clinical instructor scoring them as passing according to the appropriate Behaviorally Anchored Scale (BARS).

Plan

The students practiced administering parenteral medications with planned instructional methodology based on replicating a portion of a study done by Brydges, Carnahan, Rose, and Dubrowski (2010). According to Brydges et al. (2010), progressive simulation is described as an environment where the student makes the decision of when to progress from one simulation station level to the next. The progressive simulation for this project was in the formation of three stations with each station increasing in complexity that requires clinical reasoning during the medication administration process, utilizing multiple levels of simulation.

Outcomes and Results

A total of 21 students completed the progressive simulation process. Self-efficacy surveys completed by participants prior to and following the intervention revealed a statistically significant difference with an increase in self-scoring ($t= -3.889$, $p=.001$). In the clinical setting, 95.3% of the participants scored a passing score, successfully demonstrating capability in medication administration and clinical reasoning but the statistical analysis was not statistically significant ($t= -3.874$, $p=0.51$). Faculty surveys did not reveal a statistically significant increase in satisfaction with the curriculum change ($t= -2.075$, $p=.060$), but the evaluations included positive comments from students and faculty that supported maintaining the curriculum change.

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To my family, who have been so very supportive of my

educational pursuits at this stage of my life. I love you all!

To my parents, who taught me that I can do anything I dream to do.

To my children and grandchildren,

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Amanda, Jeremy, Dalton, and Delaney

Katie and Juni

Kiddos, Mo is ready to go play!

And to my husband, John, I could never have done this

without your love and support - thanks for keeping me on track

and holding me up when times were rough.

Thank you for making me smile!

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Problem Recognition and Definition

Statement of Purpose

Wharton County Junior College (WCJC) faculty members indicated concerns about the methodology that was utilized in teaching medication administration to Associate Degree Nursing (ADN) students. Concerns focused on the student's ability to transfer medication administration information/skills learned in the campus lab to the clinical setting. Students who had demonstrated competency in medication administration in the campus lab were unable to demonstrate capability in the clinical setting.

The Institute of Medicine (IOM) reported that a hospital patient was subject to at least one medication error per day on average, with considerable variation in these error rates across facilities. (Aspden, 2007). Errors made by nursing students during the medication administration process center on performance deficits as a prevalent cause (Wolf, Hicks, & Serembus, 2006). Students have the knowledge of how to safely perform the skills but cannot demonstrate the skills utilizing clinical reasoning in the hospital environment.

The purpose of this capstone project was to evaluate a curriculum change in the campus lab of WCJC. The curriculum change was designed to facilitate the transition of the nursing student from being competent in the stable and predictable environment of the campus lab to being capable in the unstable and unpredictable clinical environment. The focus was on administering parenteral medications, specifically intramuscular (IM) injections, subcutaneous (sub-q) injections, and intravenous piggyback (IVPB) medications. The planned methodology was based on replication of a portion of a study done by Brydges, Carnahan, Rose, and Dubrowski (2010). According to Brydges et al. (2010), progressive simulation is described as an environment where the student makes the decision of when to progress from one simulation station level to the next.

Three stations of increasing complexity where the students needed to engage in clinical reasoning comprised the progressive simulation for this project.

Will students of an Associate Degree Nursing Program demonstrate evidence of successful transition from competency in the lab environment to capability in the clinical environment with the utilization of progressive simulation of medication administration in the campus lab using multiple levels of simulation and incorporating clinical reasoning versus the current instructional methodology which is task focused to teach medication administration in the campus lab utilizing static low fidelity models?

The population, intervention, comparison, and outcome (PICO) elements developed for this study consisted of the population of an Associate Degree Nursing Program utilizing the intervention of progressive simulation of medication administration in the campus lab using multiple levels of simulation and incorporating clinical reasoning. The planned comparison was to what the current instructional methodology had been, which was task focused to teach medication administration in the campus lab utilizing static low fidelity models. The outcome was evidence of the student successfully transitioning from competency in the lab environment to capability in the clinical environment.

Project Significance, Scope, and Rationale

Population significance. WCJC is a small community college that serves four counties. These counties are Wharton, Colorado, Matagorda, and Fort Bend. The enrollment of the fall term of 2010 at WCJC was 43% male and 57% female. The underserved and vulnerable population that WCJC serves is defined in Table 1 and Table 2, below.

Table 1. Demographics of Feeder Counties of WCJC

	Wharton	Colorado	Matagorda	Ft Bend	WCJC Student Enrollment Fall Term 2010
Race-White	72.2%	75.1%	71.2%	50.6%	50%
Race-Black	14.1%	13.1%	11.4%	21.5%	12%
Race-Hispanic or Latino origin	37.4%	26.1%	38.3%	23.7%	28%
Race-American Indian and Alaska Native	0.4%	0.4%	0.7%	0.4%	1%
Race-Asian	0.4%	0.4%	2.0%	17.0%	8%
Population	41,280	20,874	36,702	585,375	6,668

(US Census Bureau Quick Fact, 2010; Wharton County Junior College, 2010)

Table 2. Economic Status of Feeder Counties of WCJC

	Wharton	Colorado	Matagorda	Ft Bend
Median Household Income	$41,678	$22,676	$43,205	$79,845
Persons below poverty level	17.2%	15.2%	21.6%	8.0%

(US Census Bureau Quick Facts, 2010; Wharton County Junior College, 2010)

Scope. When assessing nurses employed in 1997, Associate Degree Nurses accounted for over 60 percent of the graduates. Graduates were from two year postsecondary communities, technical, or junior colleges (American Association of Community Colleges, 2000). The American Association of Community Colleges went on to report that the Associate Degree in Nursing accomplishes the following:

- Increased the available number of registered nurses qualified to meet the changing health care needs of the people in the United States;
- Provided historically underserved populations with affordable access to the nursing profession;
- Ensured an increased number of registered nurses practicing are available in a variety of health care settings including long term care facilities, clinics, home health agencies, hospitals and other competency-based facilities; and,
- Provided students with a community-based professional nursing degree.
- Provided the nation with a cost- and time-efficient delivery system for a critical sector of the health care industry.

According to the U. S. Department of Health and Human Services (2000), the largest percentage of nurses employed in key environments of hospitals, nursing homes, and ambulatory care centers, were prepared at the ADN level. When considering the care that these nurses provided to the patients, they noted that medication administration via IM, sub-q, and IVPB routes were frequently performed by the ADN nurse. The ADN represented 38.4 % of hospital based staff and 48.2 % of nursing home staff. Associate Degree prepared nurses represent 41.8% of staff nurses.

It is a responsibility of educators in the ADN programs to assure the students are afforded opportunities to transition from the stable and predictable environment for medication administration in the campus lab to administering medication in the unstable and unpredictable environment of the clinical setting in order to minimize medication errors.

Rationale. For the past year, faculty meetings at WCJC have frequently broached the subject of clinical performance of the ADN students. Clinical reasoning has been targeted as a problem

for many students in this unstable and unpredictable environment. Discussion ensued that the students identified as having problems in performing skills in the clinical setting were able to pass the campus lab check offs without difficulty. The practice in the WCJC campus lab was to have students view a video or demonstration of a skill and then practice that skill on a stagnant model in small groups, preparing for a pass/fail check off on the same stagnant model. Curriculum lacked a plan to support/enhance the student's transition from being competent in the campus lab to being capable in the clinical environment utilizing clinical reasoning.

According to the IOM publication, *To Err is Human*, "One of the report's main conclusions was that the majority of medical errors do not result from individual recklessness or the actions of a particular group which was not a 'bad apple' problem. More commonly, errors were caused by faulty systems, processes, and conditions that led people to make mistakes or fail to prevent them. Clearly, addressing the safety issue was critical with estimated deaths from medical error ranging from 44,000 and perhaps to as many as 98,000 annually" (Kohn, Corrigan, & Donaldson, 2000, para. 1). WCJC incorporated processes that facilitated the transitioning from campus lab to clinical environment to move the students toward fully understanding the medication administration process and safety practices to prevent errors.

When gathering data for a study on the Safe Administration of Medication Scale (SAM Scale) to objectively measure student nurse ability in identifying medication errors, associate degree student nurses made more errors than baccalaureate degree student nurses on the same medication items (Ryan, 2007). Around 75 percent of novice nurses made medication errors with 30 percent of these errors related to errors in critical thinking. Time management also emerged as a factor (Saintsing, Gibson, & Pennington, 2011).

Theoretical Foundation for Project and Change

Upon beginning the search for theories to assist with this practice issue, clarification was needed to differentiate between competency and capability. An internet search led to a blog site by Brett Henderson (2007), an engineering manager for a software company in Australia. He blogged:

> For any Situation, there are known and unknown situations. Similarly there are known and unknown Problems. Our ability to deal with Known Problems in Known Situations is reflected in our Competency. When we are presented with an Unknown Problem in an Unknown Situation, it is our abilities that assist us. This is our Capability. (para. 2)

Contemplating the transition from competency to capability, a search was done for a theory that would guide an instructor in assisting the student to build this bridge. The choice was made to utilize Bandura's Theory of Self-Efficacy. "Learners with high self-efficacy set challenging goals, persevere in the face of difficulty, and engage deeply in learning and task performance" (Swing, 2010, p. 667). The assessment of self-efficacy by the student addressed the confidence a student had that a skill could be completed successfully. This enabled the student to realize mastery of a skill.

This practice issue concerned the utilization of simulation in the campus lab during the instruction of clinical skills and the remediation for clinical skills performance, enabling the student to grow in self-efficacy. The simulations were comprised of scenarios giving the student an unstable environment/situation in which to perform a skill. For example, instead of having the student simply practicing administering an IM injection to a stagnant model, the student was required to administer the IM injection to a patient with instability such as a fractured left femur,

rating his pain at nine out of ten on the pain scale. Assisting the student to develop a sense of self-efficacy or confidence over mastery of a skill was neglected in the traditional method of only practicing and assessing competency in the campus lab. Utilization of simulation facilitated growth in the sense of self-efficacy because the student was guided to develop clinical reasoning and confidence in the ability to perform a skill demonstrating capability in an unstable and unknown environment. According to Gardner, Hase, Gardner, Dunn, and Carryer (2008), Bandura predicted that self-efficacy enabled successful completion of target behavior. Bandura also noted that having a high degree of self-efficacy led to successful undertakings of new ventures. Simulation mimicked the complex, unstable environment of the clinical setting as the student practiced the skill, and afforded learning to take place across the span of competency to capability.

Self-efficacy allowed the individual an opportunity to judge themselves in accomplishing a given task (Resnick, 2010). While the student was being assessed by an instructor as a final review process before performing the skill in the actual clinical setting, the student benefitted from the interaction that occurred between the student and instructor. This interaction/evaluation enabled the student to reflect on self-efficacy and prepare for a smoother transition into this new environment. For the individual to determine self-efficacy, an evaluation tool with criteria was needed (Resnick). McGregor (2005) discussed the importance of instructors realizing that some nursing students needed more time to be successful. Remediation afforded the struggling student the necessary additional time to facilitate success. During remediation, the instructor prepared appropriate simulations to utilize in guiding the student to increasing self-efficacy and therefore reinforcing the transition from competency to capability.

In considering the methodology of how best to design simulation to facilitate the transition from competence to capability, the choice was made to utilize Neuman's System Model. The model viewed the person "…as a layered, multidimensional whole that is in constant dynamic interaction with the environment" (Heyman & Wolfe, 2000, p. 1). Incorporating a process that requires the student to look beyond a task during campus lab or remediation enabled the student to become practiced at considering the whole patient and the personal variables. Assessing the patient as a whole guided the student to approach completion of a task in a manner that prevented fragmentation of care. Understanding the whole situation assisted in the formulation of an approach that was goal directed, considering all variables influencing the patient situation at the time, and enabling the student to demonstrate capability in the unknown, unstable environment which, through this process, was now a familiar challenge.

Instructors used the Neuman's System Model when assessing a student. The instructor knew the student in a holistic way, particularly the student who struggled in the transition from competency to capability. Assessing all the personal variables which might affect the student's performance was the starting point for developing the plan for facilitating the student to be successful. If an instructor ignored a variable that caused a stressor that blocked the learning process, progression was not made. For example, the stressor may be sleep deprivation or illness. It may be due to a problem with a teenager at home, or just fear of the task being learned. Taking the time to look at the whole student directed the process of guiding and enabling the student to being directive and meaningful. The Conceptual Model summarizes the curriculum change (See Appendix A).

Literature Review. The systematic review performed for this project found existing evidence-based practice to support the purpose and desired outcomes of this study. Brydges et

al. (2010) compared self-guided and educator-guided formats in simulation-based clinical training and reported that students exposed to the self-guided formats in simulation-based clinical training were more successful in achieving the specified outcomes.

Only one article compared the student's performance in the campus lab to the student's performance in the clinical environment concerning medication administration. Megel, Wilken, and Voleck (1987) assessed errors in the clinical setting that might be attributed to student anxiety in the clinical environment versus the campus lab environment. Review of their findings led this author to be curious about other aspects of the student that may attribute a difference in performance from one environment to the other. Further literature review led to the incorporation of self-efficacy in this study. Gibbons, Dempster, and Moutray (2010) reported that from the range of coping resources available for student nurses, those that enhanced self-efficacy, control, and support were most likely to be successful in mastery of tasks.

Several authors reported on the effectiveness of simulation in demonstrating improvement in student performance over the traditional campus lab approach. Sears, Goldsworthy, and Goodman (2010) conducted an experimental study with the purpose of examining whether the use of clinical simulation in nursing education could help reduce medication errors in the clinical environment. The authors found that collectively, students in clinical placement generated fewer medication errors if they have had prior exposure to a related, simulation-based experience. Goldenberg, Andrusyszyn, and Iwasiw (2005) reported that simulation increased the students' perceptions of self-efficacy when comparing pretest and posttest scores. Sheperd, Kelly, Skene and White (2007) found that utilization of simulation versus traditional instruction, with low fidelity models and lecture resulted in higher test scores on performance ratings. Daniels et al. (2010) also found that students who participated in simulation demonstrated a significant

improvement in performance management of dystocia and eclampsia. Jarzemsky and McGrath (2008) performed a study which involved a comparison of pretest and posttest surveys indicating significantly higher self-ratings for confidence, ability, stress management, and clinical reasoning when utilizing simulation in the campus lab. A summary of the literature supported the concept that simulation aids in preparing students for clinical experiences.

Cheraghi, Hassani, Yaghmaei, and Alavi-Majed (2009) discussed the use of self-efficacy to guide the student in identifying success which further motivated the student to persevere and be more successful. The lack of self-efficacy was evidenced when the student who had the ability to perform a skill could not demonstrate it. Gardner et al. (2007) described students with more self-efficacy as being more creative and innovative with increased ability to use their competencies in novel and complex situations as well as the familiar situations.

Based on the evidence found in the literature, simulation has been found to be a better way to prepare nursing students for clinical experiences. Progressive simulation offered the student an autonomous learning environment enabling meaningful preparation for medication administration in the clinical setting. The initial systematic literature review can be found in Appendix B.

Market/Risk Analyses

Project Strengths, Weaknesses, Opportunities, Threats

A market analysis of this project was performed which includes primary strengths, weaknesses, opportunities, and threats (SWOT) (See Appendix C). A SWOT analysis enabled review of the project status at a glance (Fortenberry, 2010). This analysis identified strengths that included creativity in development which allows the student to direct learning. The author of this project is passionate and motivated to facilitate student success and can base strategies on over

20 years of direct patient care experience and eight years of educational experience. The author has a strong base in education having earned a Master of Science degree with certification in health care education and experience in evidence-based practice and literature research. The WCJC faculty was actively seeking a curriculum change at this time, to facilitate student success, with concerns focusing on medication administration. The WCJC ADN program director has provided a letter of support for this project (See Appendix D).

Opportunities that were identified include the education industry's growing need for innovative methodology of teaching with trends toward individual learning experiences in the simulation environment. Nursing education experienced decreased availability of clinical sites for nursing students thus increasing the need for simulation in the campus lab to meet clinical experience requirements. The Texas State Board of Nursing recognizes simulation as a clinical experience but has not ruled on acceptable ratios of clinical to simulation. Texas nursing programs vary in use of simulation from 20% to 50% of the clinical hours.

Weaknesses identified for this project include the author's lack of experiencing in performing a study and the lack of proven progressive simulations. The progressive simulations utilized during this study were designed from scratch and had not been tested for validity. Threats to the study include a declining economy resulting in decreased educational funding. Faculty hesitancy to accept change was also identified as being of great concern.

Driving/Restraining Forces

Driving forces were assessed first. The Director of the WCJC ADN program received a grant in 2010 to update the current facility which resulted in the installation of audio-visual equipment to monitor three of the 10 beds in the lab. This offered the potential to afford the ADN students the utilization of higher technology and increased simulation.

Restraining forces would include lack of full time lab faculty and no information technology (IT) support. This resulted in minimal use of the new technology. The Director was very supportive of increasing utilization of the technology but was met with resistance by the faculty, fearing increased time demands and challenges weighing on an already very busy work load. Development and utilization of simulation is additional to a regular workload. There are no funds at present and no plans being considered to hire lab/IT personnel for this lab. This author was considered the simulation champion but due to time constraints of an already busy work load, little time was found to devote to simulation.

Other barriers identified at this time concerned increasing utilization of simulation for the ADN students at this time with a nursing faculty of a blend of ages and experience in education. Out of 11 current faculty members, only two are under the age of 45. Three of the faculty members have been teaching for 30 plus years and are have considered retirement in the near future. This author has noted hesitancy by the majority of the WCJC faculty in utilizing simulation in teaching. Simulation was used one to two times a semester and it was not currently being utilized for medication administration teaching and skills assessment. After attending three large conferences throughout the summer of 2010 with many sessions focusing on simulation, this author noted that frequently faculty admit to having the capability of utilizing simulation but do not have the motivation to use simulation. Many faculty members have reported the simulation manikins remain in a box in the corner of the lab due to already full workloads and no one available or willing to take on the task of setting up them up.

Potential constraints for this project also included the time factor for the students in the campus lab. The student were given ample time to complete the progressive simulation. Additional time needed to be available to repeat a second or third progressive simulation if the

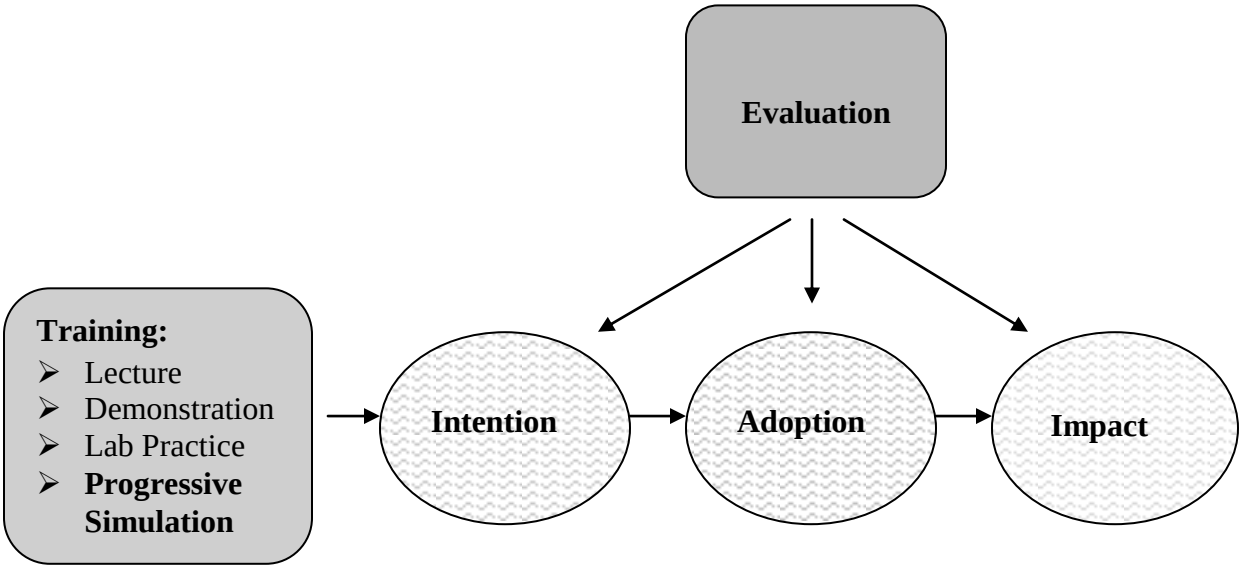
student felt it necessary. Instructors needed to be available to assist students as indicated but autonomy for the simulation had to be preserved. Scheduling the simulation lab and the instructors for availability was also a potential constraint.

There was a limited amount of supplies available, particularly with the IVPB method of medication administration. Each student had enough supplies to perform an IVPB from beginning to end twice. Should the student have needed more practice, supplies were recycled, which may have decreased the realism of the task.

Need, Resources, and Sustainability

The forecasting model. The forecasting model chosen for this curriculum change was the Predictive Evaluation (PE) Model as shown in Figure 1. PE allowed nursing faculty to predict the results of educational efforts in the overall performance of the nursing student and future nurse. The PE model consisted of four steps: training, intention, adoption, and impact with evaluation on-going throughout the process (Basarab, 2011). The on-going evaluation process allowed faculty to make changes as indicated as soon as the need for change in the process was identified. This afforded faculty an opportunity to meet the immediate needs of the learner currently involved.

Figure 1. The Predictive Evaluation Approach



(Basarab, 2011, pg. 23)

The Impact Matrix for this PE (See Figure 2) answered two questions:

1. What were the desired results (intentional goals) of each step of the medication administration process?
2. What observable action (adoptive behavior) did the student perform to meet the desired result?

Figure 2. The Impact Matrix

Impact Matrix		
Intentional Goal	**Adoptive Behavior**	**Number of Students/New Graduates Who Will Successfully Adopt From the Total Trained**
Administer the **Right Medication**	Perform three checks to verify that the **Right Medication** is being administered	100%
Administer for the **Right Reason**	Utilize resources as necessary to gain an understanding that the patient is receiving the medication for the **Right Reason**	100%
Administer to the **Right Patient**	Check two patient identifiers to assure medications are administered to the **Right Patient**	100%
Administer utilizing the **Right Route**	Utilize resources as necessary to confirm that the patient is receiving the medication utilizing the **Right Route**	100%
Administer at the **Right Time**	Utilize resources as necessary to confirm that the patient is receiving the medication in the **Right Time** frame as well as demonstrate good time management	100%
Administer the medication utilizing **Correct Technique**	Demonstrate **Correct Technique** when administering medication	100%
Complete **Correct Documentation**	Demonstrate ability to utilize the **Correct Documentation** procedure for facility	100%

The Predicted Return On Investment (ROI) of the training and check offs is the ideal in healthcare, no medication errors. See Figure 3.

Figure 3. The Predicted ROI

Predicted ROI For Medication Administration Check Offs Every Semester in Nursing Programs	
	Impact
Year One	0 medication errors
Year Two	0 medication errors
Year Three	0 medication errors
Year Four	0 medication errors
Year Five	0 medication errors

Education industry. The IOM estimated conservatively that medications harm at least 1.5 million people per year, with hospitals averaging one medication error per patient day. This study also noted that medication-related adverse events were the single leading cause of injury in healthcare. (Bates, 2007). Nursing schools were faced with graduating nurses to enter the healthcare profession prepared to contribute to the decrease in this medication error trend.

"The increase in patient acuity in the primary and secondary settings is continuing with a corresponding increase in the need for technological competence in these areas" (Nickless, 2011, p. 199). Faced with this trend, new graduates care for higher acuity patients in the general acute care setting. Patients, who in the past were placed in an intensive care unit, were now being cared for in the general unit, such as a medical surgical unit. New nurses must be prepared to face the challenges that this level of care present, having the capability to clinically reason.

Traditionally, nursing education has been knowledge based. Candela, Dalley, and Benzel-Lindley (2006) describe the traditional method of nursing as teacher-centered with a one way transmission of knowledge. "Curriculum needs must expand beyond linear thinking and include

content that is adaptable to the changing health care environment" (Stanley & Dougherty, 2010, p. 378).

The IOM (1999) in *The Future of Nursing: Focus on Education* reports that nurses are vital to transforming the health care system to provide safe, quality, patient-centered, accessible, and affordable care, rethinking their roles. The IOM went on to say that there must be a movement from task-based proficiencies to higher-level competencies enabling utilization of knowledge and decision making skills, preparing the nurse to work in a variety of health care settings. Nurse educators must move toward enabling the student to develop clinical reasoning while caring for the patient holistically and doing so in a more efficient, and cost-effective approach.

Simulation can provide a safe environment for nursing students to test their new knowledge when faculty creates the unstable and unpredictable environment that may not always be accessible to the student in the clinical setting. Clinical rotations are a grab bag of experiences at times, with faculty noting excellent days where experiences are in abundance as well as days when students are not challenged as much as could benefit them. With clinical time such a precious commodity in today's educational environment, simulation can supplement and enhance learning by allowing the instructor to design simulation focused on what the nursing student needs on an individual basis, taking into consideration the experiences that have occurred in the clinical environment.

Progressive simulation is feasible for most community colleges as well as universities because there are not set rules on exactly how to design these simulations. With creativity, progressive simulations can be very affordable, especially when comparing the benefits of this style of education. This project did not include use of high fidelity manikins; it utilized medium fidelity manikins. Creativity made the unstable and unpredictable environment that was based

on actual experiences of the designer. When equipment was limited because of costs, substitutions were made. For example, this simulation lab did not have oxygen flow meters that actually allowed the student to change the oxygen flow rate. In substitution, an image of a flow meter found on the internet was printed, expanded to a life-like size, and laminated. To alter the flow rate, the student used a dry erase marker to draw the floating ball at the appropriate level. Although the student could not experience the actual changes of flow rate on a flow meter, the student still took an action to change the rate, therefore implanting in the student's mind that there must be an action taken.

Risks. A possible risk with a curriculum change is the discovery of the change not being effective. If the curriculum change was found to be unsuccessful, there was the risk of returning to the traditional curriculum. There was also the risk of faculty burnout resulting from lack of success when attempting change. Curriculum change may be exciting when the transformation is made but there is the risk of this excitement waning with danger of faculty wanting to return to the old curriculum because it was less labor intensive and more familiar. Lab equipment, such as manikins, will age and need to be replaced, adding the risk of future costs.

Participant risks were identified. If the participant finds that she/he is not successful in performing skills when checked off, student anxiety may be a factor when reflecting on (or reporting) self-efficacy. Student discomfort may be a risk since progressive simulation is a new learning environment. Failing the check off and having to do remediation may produce significant distress in students.

Unintended Consequences. Unintended consequences resulting from this study have been discovered to include the amount of work that progressive simulation development requires. During the process of completing and developing this project, it became clear that this

curriculum change demanded a great deal of effort. Several of the faculty members of WCJC hesitated to take on the additional effort and the demand for creativity and innovation. There may also have been a placebo-effect with students possibly doing better in simulation at the beginning because they were part of a study.

Stakeholders and Project Team

Stakeholders. The primary stakeholders of this study are the students who are utilizing simulation as an enhanced learning strategy. The student relies on the faculty to offer guidance in learning opportunities enabling the student to master the capability of representing health care as a trusted professional. Achieving capability in medication administration will affect the new graduate's ability to provide safe and effective care to patients. Faculty is also primary stakeholders as they prepare new graduates entering the healthcare field. In conjunction with all nurse educators, faculty are invested in providing nursing students the best opportunities to learn, facilitating the student to achieve high levels of self-efficacy in the care that will be provided to the patient.

Secondary stakeholders are the patients and the public as they receive care provided by more prepared, capable nurses. The patient's trust is placed in the nurse to administer medications correctly, including not only the task, but the clinical reasoning that surrounds the medication administration and outcome process. The general public assumes that graduate nurses who become registered nurses have the ability to live up to the standard of this role.

Project team. The core project team for this capstone project consists of Director of the WCJC ADN program, three level four faculty members, two other faculty members involved with education in the lower levels, and the Capstone Chair.

Cost-Benefit Analysis

This study focused on 21 Level four students. Three progressive simulations were established for unlimited student use. Grant funding provided audio-visual equipment for the check-offs. The cost analysis revealed that the initial investment of $56,461.66 established a simulation lab conducive to progressive simulation, beginning with the stations of simulation and ending with the audio-visual recording of the check off and subsequent remediation (See Appendix E).

Verbal feedback of study participants and faculty has provided the benefits of simulation. The study participants verbalized that the progressive simulations helped in identifying personal weaknesses and allowed each student time to grow as an individual. Faculty were pleased that the majority of the students were successful with the first medication administration check-off. Faculty identified weaker students and provided the necessary remediation to them. Only one student left the program as result of the initiation of progressive simulation.

Expanding the use of progressive simulation in nursing education will afford students the opportunity to incorporate clinical reasoning in the campus lab. The new graduate's nursing care, beyond medication administration, demonstrated improved capability to perform in the clinical environment.

The conclusion was that the benefit of progressive simulation was worth the cost. As a result of this curriculum change, faculty felt that the students were better able to utilize clinical reasoning with an enhanced understanding of its importance in patient care.

Project Plan and Evaluation

Mission/Vision

The mission of this capstone project was to provide methods of innovative simulation which facilitates and empowers nursing students as they transition from competency to capability when

performing medication administration. The vision of this capstone project was for nurse educators to recognize progressive simulation as a valuable addition to curriculum for a diverse population.

Goals

The proposed outcomes were nurse-sensitive. The focus of this outcomes research was on a curricular change in medication administration instruction. The goal was to decrease medication administration errors as graduates enter the profession as nurses.

Objectives

The following were the objectives established for this project:

1) Upon completion of the progressive simulation, check-off scoring, and clinical environment scoring, the WCJC faculty will rate the quality of the new methodology adapted to curriculum higher than the older methodology previously utilized.
2) Upon completion of the progressive simulation, the student will report an increase in self-efficacy when compared to a baseline self-efficacy (self-appraisal) assessment prior to the intervention.
3) The student who has completed the progressive simulation practice and passed the check-off simulation will demonstrate capability in the clinical environment by the clinical instructor scoring them as passing utilizing the appropriate Behaviorally Anchored Response Scale (BARS).

The hypothesis is that short term outcomes with progressive medication administration simulation will demonstrate an increased sense of self-efficacy in the students as well as the capability to correctly administer parenteral medications in the clinical environment utilizing clinical reasoning. The timeframe for this project can be found in Appendix F.

Variables

The variables in this study are:

- Independent: Self-guided progressive simulation
- Dependent: Transitioning from competency to capability in administering parenteral medications; improving self-efficacy
- Confounding: Some of the participants may have jobs which contribute to the student's knowledge base of medication administration, such as a pharmacy technician or a nursing assistant in a setting where the participant witnesses medication administration on a routine basis.

Evaluation Plan

Logic Model

According to the W. K. Kellogg Foundation (2004), the logic model is compared to a road map guiding the stakeholders from the defined need to the desired outcomes. This map of events will bring the dream to reality. Formulation of a log model enables the smooth progression of the project and decreases fruitless variances from the focus. (See Appendix G).

Inputs, which incorporate the collaboration of faculty, are crucial to success and sustainability of the proposed methodology of progressive simulation. Utilization of the simulation lab, including equipment, money, supplies, and computers offered the Level four students an environment which facilitated the student transitioning from competency to capability.

Outputs included the development of progressive simulation methodology for skill's review of parenteral medication administration which included IM and sub-q injections, and IVPB medications. Progressive simulation was new to faculty and required a training period. Faculty used the Neuman's Systems Model when remediating an unsuccessful student with the

knowledge that variables in the student's community may diminish learning from occurring. The students received explanation in use of the systems model for patient care while prioritizing care based on Maslow's hierarchy of needs.

Bandura's social cognitive theory was used to formulate self-efficacy scoring for the student. According to Resnick (2008), this theory allows the learner to evaluate and judge acquired self-efficacy, monitoring progression toward expectations. As the student identifies progress and feels more confident, the student is motivated to continue to grow. Progressive simulation enables the self-guided student to design his practice, meet his own learning needs, and benefit from his autonomy (Brydges et al., 2010).

Assumptions made were that that faculty wanted students to demonstrate capability in the clinical setting while administering parenteral medications and that students want to become capable in their practice. It is also assumed that the simulation lab will be available for use during this project and the supplies and equipment will be attainable.

The overall external factor was increasing the number of nursing programs that adapted progressive simulation for campus lab instruction. Progressive simulation fostered the educator/student collaborative relationship and afforded the student with the opportunity to be an individual learner (Brydges et al., 2010).

Population/Sampling Parameters

The participants were a homogeneous convenience sample of Level four students in Fall 2011 semester at Wharton County Junior College. Twenty-one students volunteered to participate and none were eliminated. One student opted not to participate in this study because of a conflicting work schedule with which she had to comply. She came to the lab and performed the traditional methods of practicing medication administration. Attrition bias was not anticipated due to the

close time frame of the intervention. Should a participant not have completed the total intervention process, the participant's data would be omitted from the final analysis. The surveys completed by the participants had multiple items. Missing data was addressed by utilizing a mean scale score computed on the basis of available items. (Kane & Radosevich, 2011). All twenty-one students were included in the sample size.

Descriptive statistics and inferential analysis of the data were performed with the assistance of a qualified statistician (Kane & Radosevich, 2011). This capstone project was set in the clinical lab with the last performance scoring done in the clinical setting.

Plan for data analysis. The nature of this capstone project lends itself well to utilizing a quantitative outcomes study design. Initial data collection was done by asking faculty participants to complete surveys about the current methodology utilized in the campus lab for teaching medication administration. These surveys include Likert scale ratings of one to five, with one being very dissatisfied and five being very satisfied (See Appendix H). The items include various aspects of safe administration IM, sub-q, and IVPB medications that measured the student's ability to utilize clinical judgment when performing these skills. These data were analyzed using a paired t-test.

Instruments. Quantitative data was collected by utilization of a self-efficacy evaluation based on Bandura's Response Scale. The Self-Appraisal Survey tool used for this study was tailored for Level four ADN nursing students performing medication administration (See Appendix I). The tool was formatted to allow student participants to rank self-efficacy on a scale of 0 – 100 with a score of 0 ranked as Cannot do at all, a score of 50 ranked as Moderately certain can do, and a score of 100 ranked as Highly certain can do. Students completed the survey prior to beginning the progressive simulation and upon completion of simulation. This data analysis

planned to be represented utilizing a paired t-test with one variable being pre-intervention scoring and the second variable being the post-intervention scoring. The student was allowed to work at his /her own pace completing the stations as many times as necessary to achieve self-efficacy.

The students were checked off to assessed competency and capability within four weeks of simulation completion .The students individually worked through a simulation of medication administration preparation followed by performing medication administration with a manikin during a simulation. The student was evaluated utilizing a Behaviorally Anchored Rating Scale (BARS) formatted grading rubric (See Appendix J). The evaluation used scale anchors which are clearly identified, enabling scoring consistency from rater to rater (Grussing, Valuck, & Williams, 1994). The BARS grading rubric was developed and approved by project team members prior to use. The team consisted of faculty members who had a mean of 21 years of teaching nursing. The check-offs were audio-visually recorded. During clinical rotations, the clinical instructor utilized the same BARS formatted grading rubric to evaluate the student's performance. An average score of 2 (Performed Correctly with Minimal Assistance) was required in each section; also, all critical indicators had to be scored at 3 (Performed Correctly Independently) (See Appendix K). A paired t-test was done utilizing the scores earned in the lab and scores earned in the clinical setting.

Methodology

Overview. This study was considered an evaluation of outcomes that follow a curricular change to introduce progressive simulation for preparing student nurses for clinical experiences. The students had the opportunity to choose either the standard/traditional method of practicing

medication administration in the campus lab or the progressive simulation to learn medication administration, which is the curricular change.

The standard method of practice of medication administration was task focused in a skills lab where the students could practice IM and sub-q injections in a static model such as injection pads. The student also could practice initiation of IV medication infusions per saline lock or IVPB into a continuous IV infusion on a laboratory set up. The campus lab practice time involved the students being given goals for the day to be achieved in small groups that decided the flow of the practice. Practice with medication administration took place in a stable and predictable environment.

Upon completion of the practice lab, the student scheduled a check-off with the sophomore instructors and was graded with a pass/fail. The skill had to be passed prior to administering medications in the clinical setting. The check-offs were audio-visually recorded for review. The recording could be reviewed by the initial grading instructor, reviewed by other instructors for opinions as indicated, or utilized in remediation with the unsuccessful student. If the student failed, remediation was mandated. Remediation consisted of additional practice after reviewing problem areas with the instructor, which could include a review of the audio-visual recording to focus on problem areas, leading to a repeat check-off opportunity. Consent for this recording was completed upon entry into the nursing program (See Appendix L).

Methodology of progressive simulation. The progressive simulations focused on medication administration via IM injections, sub-q injections, and intermittent IV drip medications utilizing a saline lock or a continuous IV source on a medium fidelity mannequin. Campus lab was scheduled by the individual student.

The student worked through stations of progressive simulation beginning with Station One: practicing IM and sub-q injections into a static low fidelity model such as an injection pad. The student was also able to practice inserting IV catheters utilizing an IV arm model. The BARS grading tool appropriate for the station was utilized by the student as a self-grading guide. When the student felt he/she had adequate practice, progression was made to the next station. At Station Two, the student received a written report about the patient who would be receiving the medications following Situation, Background, Assessment, and Recommendation (SBAR) format. The student had access to a patient chart which included a medication administration record (MAR), physician orders, laboratory results, and information concerning patient allergies. A reconciliation of the MAR to the physician's orders was completed by the student confirming that the medications are written correctly on the MAR when compared to the order. The student also reviewed the medications listed and made a written response to questions printed on the MAR concerning each drug. For example, if the order is for an IVPB medication, a question concerned over what time frame the student would infuse the medication. The student also reviewed the patient allergies, assessed for a drug allergy, reviewed appropriate lab results, and assessed each drug for appropriateness of the dosage. There was at least one math calculation to be completed for a dosage assessment. A drug handbook was available for the student to reference. The student prepared all medications for administration, including preparing syringes for injection. The student was expected to have knowledge of the purpose of each medication ordered. When the student felt the preparation was completed at this station, answer keys were accessible allowing the student to self-assess the work prior to moving on to the next station.

The final station, Station Three, was the actual medication administration to a medium or high fidelity manikin. Medication administration included an IM injection, a sub-q injection, and an

IVPB. In each simulation when the student entered the patient's room, there was an unstable and unpredictable environment that simulated the clinical area. For example, the student may have found a congestive heart failure patient poorly positioned in bed with the oxygen source misplaced who is complaining of shortness of breath. The student's goal was to demonstrate the capability to assess the whole patient situation utilizing clinical reasoning based on prioritization of need in responding to this situation, and then administer the medication appropriately and accurately.

The progressive simulation intervention made three different simulations available to each student. Each progressive simulation consisted of three stations. If the student felt the need to repeat the process in order to achieve self-efficacy, he/she could have made the choice to do so. The movement from station to station was instigated by the student; but if the student remained at a station for an unreasonable amount of time, as decided by the monitoring instructor, the instructor offered assistance and encouraged the student to complete the current simulation. The instructor then encouraged the student to choose another progressive simulation track, affording the student the further opportunities to experience progressive simulation to assure achievement of self-efficacy.

The check-off process was performed in the same manner as the standard method described earlier. All check-offs were audio-visually recorded and graded in the same manner. If a student who had completed progressive simulation failed, remediation was mandated. The remediation was approached in a different manner than the standard method. The instructor met with the student to initially assess the overall status of the student. The instructor spent time listening to the student and guiding the student in identifying any learning blocks or stressors. If the instructor identified stressors that warranted intervention, the student was referred to student

services. Upon completion of this session, the instructor reviewed the scoring and performance of the student during check-off and utilized the audio visual recording of the performance to assist the student in understanding problem areas. The student worked through progressive simulation again with instructor assistance as needed followed by a repeat of the check off process. The student had a total of three opportunities to pass the check off.

When the student passed the check-off, he/she was allowed to administer medications in the clinical setting with instructor supervision. During this medication administration, the instructor evaluated the student utilizing the same BARS tool that was used for the check-off.

Data collection. Participants completed a self-efficacy assessment prior to and following the progressive simulation. The students were assessed for competency and capability within four weeks of completion of the progressive simulation by completing the check-off process. Faculty other than this author evaluated students, utilizing a BARS formatted grading rubric. The BARS style of evaluation was inclusive of scale anchors which are clearly stated, enabling scoring consistency from rater to rater (Grussing, et al., 1994). This grading rubric was approved by the project team members prior to use. The team of faculty members reviewed the BARS and established face validity. All participating faculty attended a training session to become familiar with the grading rubric. When the student progressed into clinical rotations, the clinical instructor utilized the same BARS formatted grading rubric to evaluate the student's performance in that environment.

Protection of human subjects. This author completed the CIT Collaborative Institutional Training Initiative (See Appendix M). Regis University Investigational Review Board (IRB) granted permission for the study (See Appendix N). This author assured that the faculty understood that students in the campus lab had the choice to decide to participate in the

progressive simulation or to practice medication administration as previously taught. If the student chose to utilize the progressive simulation, the student completed the program as designed including the self-efficacy evaluations.

The students gave implied consent by means of voluntarily completing the pre-simulation Self-Efficacy Survey. Completion of the self-efficacy survey by the student prior to undergoing progressive simulation implied consent to participate in the study. The student took the initiative to utilize the opportunities offered. Volunteer participants were given an Information Sheet (See Appendix O). If the student chose to utilize the traditional method of practice, he/she was allowed to do so, and was allowed general practice time in the lab followed by the check-off. Students were informed that they could withdraw at any time and there were no penalties.

Confidentiality of the data collected during the progressive simulation was maintained. Completed BARS and the Self-Appraisal Survey information was directly obtained by the investigator and filed in a secure, locked location. The investigator did not participate in grading the students during check-offs or in the clinical setting. Once data was collected, student names were removed from forms by the investigator and replaced with assigned numerals.

Advantages of progressive simulation methodology. Accessibility to innovative learning methodology allowed the student autonomy in learning without peer pressure. The design of the simulations imitated real clinical situations. Each station afforded the student an open time frame to gain the knowledge. The student self-graded utilizing the same BARS tool as instructors would be utilizing before moving making the decision to move to the next station. Instructors were available to offer assistance at any time. If a student was not progressing from station to station, an instructor offered assistance/guidance. “Psychomotor learning studies (Chiviacowsky & Wulf 2002; Keetch & Lee 2007) have shown that students who self-guide their practice learn

more than those whose practice is externally controlled. This educational benefit may result from self-guided students having better awareness, in the moment, of whether or not the current learning episode is going well. Students may use this spontaneous self-monitoring process to make better learning decisions" (Brydges, et al., 2010, p.1833-1834).

Progressive simulation is cost-effective in that it can be accomplished utilizing static low fidelity models and medium fidelity models, with the option to utilize high fidelity manikins subsequently increasing the costs. Minimal instructor supervision is required. Having one instructor available for three students is adequate. Progressive simulation affords an opportunity to alter the design to meet varying levels of educational needs.

Typical simulations designed for nursing students assign roles for more than one student, which affords the opportunity for an individual member to go through the motions while not meeting personal learning needs. Though this methodology holds great value in learning collaboration and team work, it carries the risk of not meeting needs of that individual student. A literature search was done seeking support for this observation, but that search was unsuccessful. The statement is made based on this author's experience in doing simulation over a four year span of teaching and utilization of simulation. If a student struggles with some portion of the simulation, minimizing actions or just being quiet during that moment affords this student a missed opportunity for learning due to peer pressure or time constraint. Since the end phase of medication administration is an individual responsibility, simulation directed to the individual is valuable. Progressive simulation affords the opportunity to the individual to gain an understanding of resources available to problem solve defining importance of individual accountability to the process of medication administration.

Instrumentation reliability/validity. According to Kane and Radosevich (2011), "Assessing reliability involves showing that a health outcomes measure produces reproducible results" (p. 63). To establish inter-rater reliability, all instructors observed one student, utilizing the audio visual recording, performing in a simulation, and completing the BARS tool. A Cronbach's alpha coefficient of 0.70 or higher is considered acceptable (Zaccagnini & White, 2011). The inter-rater reliability for this study had a Cronbach's alpha coefficient of 0.999. The same BARS grading rubric was utilized in the clinical setting when the student performed medication administration.

Validity was established by using designs of surveys that have been proven valid in the research world in similar situations. According to Kane and Radosevich (2011), this type of validity is known as face validity confirming that the measure suitably measures the construct and possibly the judgment of the respondents that the measurement tool items make sense. The Bandura self-efficacy response scale is a long established and proven measurement tool. According to Niedermann et al. (2010), "Self-efficacy is one of the most powerful determinants of behavior" (p. 143).

Project Data Analysis and Findings

The project data was analyzed utilizing the Statistical Package for the Social Sciences (SPSS).

Results

Objective one. Upon completion of the progressive simulation, check-off scoring, and clinical environment scoring, the WCJC faculty will rate the quality of the new methodology adapted to curriculum higher than the older methodology previously utilized.

Analysis. A paired t-test was completed, using the mean scores of faculty responses when rating the quality of progressive simulation and the quality of the previously used methodology.

The WCJC faculty did not rate the quality of the new methodology adapted to curriculum higher than the older methodology previously utilized (CI -2.81558 - .14225) (See Table 3).

Table 3. Faculty Response

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PreviousMethod	3.1767	3	.65317	.37711
	NewMethod	4.5133	3	.13868	.08007

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PreviousMethod & NewMethod	3	.505	.663

Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PreviousMethod NewMethod	-1.33667	.59534	.34372	-2.81558	.14225	-3.889	2	.060

Findings. Upon completion of the progressive simulation, check-off scoring, and clinical environment scoring, the WCJC faculty rated the quality of the new methodology adapted to curriculum higher than the methodology previously utilized but the difference was not statistically significant. In lieu of no statistical significance, comments of support for the curriculum change were made by the Level four instructors who scored the participants. These comments included noting that the students who still required close attention of the instructor in

the clinical setting were students who struggled during the check off process. Faculty overall found the simulation/scenario approach during the check off was beneficial in enabling the students to measure their own self-efficacy in caring for a "real" patient.

Objective two. Upon completion of the progressive simulation, the student would not report an increase in self-efficacy when compared to a baseline self-efficacy (self-appraisal) assessment prior to the intervention.

Analysis. A paired t-test was used to compare the mean self-efficacy scores of students after completion of progressive simulation to the mean self-efficacy scoring of students prior to progressive simulation. The student did report an increase in self-efficacy when compared to a baseline self-efficacy (self-appraisal) assessment prior to the intervention (CI -448.732 - -134.601) (See Table 4).

Table 4. Self-efficacy Scores

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	SESPre	4514.76	21	400.317	87.356
	SESPost	4806.43	21	314.134	68.550

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	SESPre & SESPost	21	.556	.009

Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deiation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	SESPre - SESPost	-291.667	345.052	75.297	-448.732	-134.601	-3.874	20	.001

Finding. Upon completion of the progressive simulation, the student participants reported an increase in self-efficacy when compared to a baseline self-efficacy (self-appraisal) assessment prior to the intervention.

Common statements made by participants concerning the progressive simulation experience included that there was more one on one time with no pressure on the student to work quickly. Also, the students felt that the situations presented were similar to real life and this lead them to see the patient as a whole, with many faucets of care needed.

Objective three. The student who has completed the progressive simulation practice and passed the check-off simulation will not be able to demonstrate capability in the clinical environment by the clinical instructor scoring the student as passing utilizing the appropriate Behaviorally Anchored Response Scale (BARS).

Analysis. A paired t test was used to analyze the means of the BARS scored during check-offs in the campus lab and the means of the BARS scored during medication administration in the clinical environment. (CI .105910 - -440735) (See Table 5).

Table 5. BARS Scores

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	CheckOffBAR	2.71686	21	.545563	.119052
	ClinicalBAR	2.93667	21	.119520	.026081

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	CheckOffBAR & ClinicalBAR	21	.586	.005

Paired Samples Test

Paired Differences					T	df	Sig. (2-tailed)
Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
			Lower	Upper			
-.219810	.485342	.105910	-.440735	.001116	-2.075	20	.051

Findings. Of the 21 participants, 19 were able to maintain or improve BARS of the campus lab performance to BARS of the clinical performance by demonstrating capability. One student, who scored 2.67 after three check-off attempts in the campus lab, was unable to demonstrate capability in the clinical environment. This student was allowed to administer medications in the clinical environment having achieved a passing grade for the second check off as described in the grading policy. During the clinical medication administration, the clinical instructor monitoring this student stopped the student due to multiple errors in medication preparation, deeming the student un-safe to complete the process. The student received no BARS rating for her clinical performance and was instructed to leave the clinical setting. The Director of the program met with the student and the clinical instructor resulting in student deciding to leave the

nursing program at this time with the option to re-enter the program at level two. Another student passed the medication administration check off with the first attempt in the campus lab, but was unable to demonstrate capability in the clinical setting and her BARS scoring decreased in that unstable and unpredictable environment.

Discussion

Limitations

A convenience sample of level four nursing students from a small community college was used for this study. The sample size was small, consisting of 21 students. The results may not be generalizable to all nursing programs. Due to time constraints, a base assessment of the student's level of competency, capability, and ability to clinically reason prior to the progressive simulation was not obtained.

Recommendations

In order to further validate this study, it should be replicated with a larger sample. Establishing baseline performance with medication administration prior to the intervention would valuable. This study is labor and time intensive; therefore, it is suggested that the timing of the study be focused on availability of faculty willing to participate in order to assure student access to the lab and faculty guidance when seeking to repeat the progressive simulation. During this study, it was suspected that students may have desired more time in the campus lab but neglected to request it due to the full schedule of the week-long intervention and only one faculty member available.

The students reported feeling more confident after the progressive simulation process due to the increased self-efficacy noted; therefore, this author highly recommends continued use of the methodology.

Implications for Change

Continued consideration of the student as a holistic being, based on Neuman's System's Model, is supported by this study. The autonomy and self-pacing of progressive simulation allows the student to create pathways of learning that best benefit the individual student. Utilization of simulation in nursing education continues to evolve. Educators have learned the value of group simulation and are now realizing the importance of the addition of individualized simulation to complement learning.

Conclusion

Wharton County Junior College ADN program has identified a need for a change in curriculum focusing on labs offered to the learners in preparation for medication administration and utilization of clinical reasoning. This capstone project focused on the development of progressive simulations for medication administration. This methodology afforded the learner the opportunity to work through stations that increased in complexity and level of clinical reasoning needed to safely administer medications to a simulated patient in an unstable and unpredictable environment. It also offered student learning autonomy, meeting the individual needs to enable progression from competency in the lab to capability in the clinical environment. Data analysis of self-efficacy revealed statistically significant increases when pre-intervention data to post-intervention data was compared. The BARS results revealed that the participants were able to improve or maintain scores comparing the campus lab performance to clinical environment performance.

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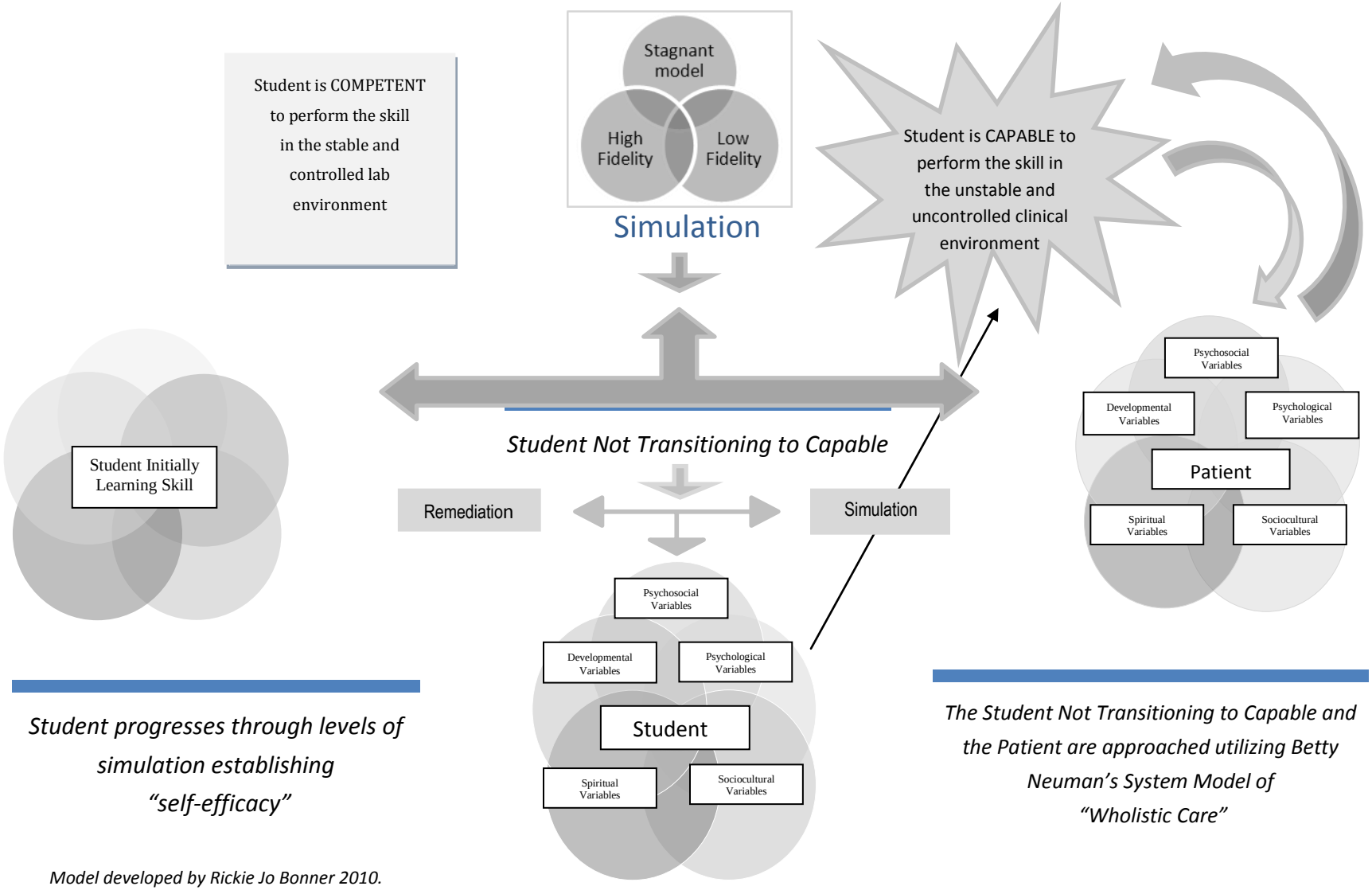
Appendix A

From Competency to Capability



Student progresses through levels of simulation establishing "self-efficacy"

Model developed by Rickie Jo Bonner 2010.

The Student Not Transitioning to Capable and the Patient are approached utilizing Betty Neuman's System Model of "Wholistic Care"

Appendix B

Systematic Literature Review

Systematic Review Evidence Table Format [adapted with permission from Thompson, C. (2011). Sample evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), *Evidence-based practice: An implementation guide for healthcare organizations* (p. 155). Sudbury, MA: Jones and Bartlett.]

Article Title and Journal	**Second-year baccalaureate nursing students' decision making in the clinical setting; Journal of Nursing Education**	**Human Patient Simulators: A New Face in Baccalaureate Nursing Education at Brigham Young University Journal of Nursing Education**	**Evaluating Borderline Student Journal of Nursing Education**
Author/Year	Baxter, P. & Rideout, E (2006). Second-year baccalaureate nursing students' decision making in the clinical setting. *Journal of Nursing Education, (45)*4, 121-127.	Bearnson, C. S., and Wiker, K. M., (2005). Human patient simulators: a new face in baccalaureate nursing education at Brigham Young University. *Journal of Nursing Education, 44* (9), 421-5.	Broznec, S., Marshall, J., Thomas, C., & Walsh, M. (1987). Evaluating borderline students. *Journal of Nursing Education, (26)*1.
Database and Keywords	CINAHL with Full Text Decision Making, Clinical; Education, Clinical; Education, Clinical; Faculty-Student Relations; Nursing Staff, Hospital; Professional-Student Relations; Student-Patient Relations; Students, Nursing, Baccalaureate	CINAHL with Full Text Computer Simulation; Education, Clinical; Education, Nursing, Baccalaureate; Patient Assessment; Perioperative Nursing; Postoperative Care	CINAHL with Full Text Student Performance Appraisal
Research Design	Qualitative; intrinsic case study	Exploratory, descriptive study	Case Study

Level of Evidence	VI	V	VI
Study Aim/Purpose	The purpose of this study was to explore the decision making activities of baccalaureate nursing students in the second year of a 4-year program. The study was designed to: ● Discover how second-year baccalaureate nursing students determine the need to make a clinical decision. ● Determine how they respond to a pending clinical decision. ● Discover the types of decisions nursing students make in the clinical setting. ● Explore the factors that enhance or impede the decision-making process.	The purpose and specific aim of this study was to explore the benefits and limitations of using an HPS as a substitute for one day of actual clinical experience for first-year baccalaureate nursing students.	Discussion of the overall problem of clinical nursing evaluation has appeared in the literature for years. The literature suggests that inter-rater reliability and faculty consensus may be strengthened by exploration and in depth discussion of this problem.
Population Studied/Sample Size/Criteria/Power	The study involved 12 students, all of whom were enrolled in their first clinical rotation on an inpatient unit and completed journals and interviews.	The student groups had completed 5 weeks of a 6-week clinical rotation. Each student had been providing total care for one postoperative patient on 2 consecutive days each week.	A first quarter senior nursing student enrolled in her fourth sequential nursing course which introduces normal behavior science theories.
Methods/Study Appraisal/Synthesis Methods	The nursing students were involved in one of two clinical settings: a 19-bed gynecological surgical unit or a 35- bed orthopedic surgical unit. Both units had a mixed-skill staff,	In this exploratory, descriptive study, two groups of students and their instructors participated in simulated clinical experiences with an HPS. For this experience, each student group was brought into	The case study was structured as such to address the especially difficult task of evaluating intangible characteristics.

	which included registered nurses (RNs) and registered practical nurses (RPNs). One clinical faculty member (tutor) from each of the two clinical areas (gynecology and orthopedics) was asked to participate in the study. The role of the clinical tutor was to provide support, facilitate learning, and offer formative feedback to the students. Data were collected from participants using journals and interviews. For 2 weeks, after the clinical day, each student completed a weekly journal, which served as a springboard for discussion during the interview. Unstructured interviews were used to explore the issue of student decision making in depth (Streubert & Carpenter, 1999). Semi-structured interviews were also conducted with the two clinical faculty members (tutors). An interview guide provided direction, and the interviews were audiotaped and transcribed verbatim. Inductive analysis, which allows for the emergence of various categories, was used in this study. The process of data analysis	the simulation room for a 2-hour session. In each session, three different preprogrammed simulated patients were used. A brief survey instrument, using a Likert-type scale from 4 (strongly agree) to 1 (strongly disagree), was created for this study. The survey had four positive statements about the session, and students rated their agreement or disagreement with the statements. Three open-ended questions asked what students had learned, what would improve the simulation session, and whether they would recommend doing it again.	

	prescribed by Miles and Huberman (1994), which involved a constant comparative approach in order to chunk information, was followed. These chunks of information resulted in a list of topics that were then abbreviated and used as codes. This list of codes was used to reanalyze the journals to determine whether any pertinent information had been overlooked or whether additional codes needed to be added. The topics discovered in the data were turned into categories. To avoid a long list of categories, topics that were related were placed in the same category (Tesch, 1990). The categories were then examined to determine whether any overlapping had occurred. Analysis of the interview transcripts followed the same process as journal analysis.		
Primary Outcome Measures and Results	The findings revealed that when students recognized the need for a clinical decision, they made every effort to make a decision that would benefit the patient. It was also revealed that students did not avoid providing care for their patients. Rather, in most cases,	Results of the brief survey instrument showed students' perceptions of the learning experience were positive. The mean scores of each of the four survey items were: ● Working with SAM increased my knowledge of medication side	The discussion of whether or not to pass Anne brought out many different view-points among faculty members. One clinical instructor who was in favor of passing Anne stated that the instructor had not provided the appropriate situations to allow her

	they responded with a decision to seek help in making decisions. The first was most often to seek help so they could then proceed to make decisions in two main areas: those related to patient care and those related to clinical tasks. Factors influencing student decision making include the students' knowledge base, level of confidence, and fear. Students feared making the patient angry with them, making a wrong decision, and causing harm to the patient. The significant role of nursing staff in students' decision making was a surprising discovery. The students often approached the nurse when they were confused about a clinical situation and unsure about what to do. Students listened to the nurse, then acted based on the nurse's advice. From their position of authority, the nurses were able to direct the students in the provision of care. The data also revealed that decision making was a complex process for the nursing students. In this study, the students did not avoid providing care for their patients. Rather, they often made a	effects (3.13). ● Working with SAM increased my knowledge of differences in patients' responses (3.31). ● Working with SAM increased my ability to administer medications safely (3.06). ● Working with SAM increased my confidence in my medication administration skills (3.00).	to demonstrate clinical competency in certain key behaviors. This is a very important point. While it seems obvious that the instructors should select patient situations which allow performance of behavioral cues, many students need more than "one chance" before they can exhibit competency. Out faculty felt very strongly about opting for an extension of clinical hours if more time and observation was needed to make a decision about a "borderline" student. In addition, the extra time may alleviate the uneasiness of deciding to pass or fail the "borderline" student.

	decision to seek help to ensure their patients' needs were met.		
Author Conclusions/ Implications of Key Findings	Curriculum developers should consider laboratory sessions that specifically discuss issues of intimidation, fear, and the roles of the nursing student, patient, and nursing staff to prepare students for "real-life" clinical settings. A second aspect to be considered in the area of curriculum is the need to teach students about potential sources of conflict in the clinical setting and to provide strategies to manage such conflict. Students must be aware of such potential in the clinical setting and taught communication and conflict-resolution skills prior to and during their clinical rotations. The results of this study reinforce the need for clinical tutors to recognize their role in helping students make sound clinical decisions. Tutors must also recognize the power of the student-nursing staff relationship. It is imperative that clinical tutors work in collaboration with nursing staff to ensure student decision making is facilitated and promoted. In addition, tutors must recognize the power of the patient	Human patient simulators offer a new medium for safe and effective experiential learning with baccalaureate nursing programs. With access to an HPS, the extent of possibilities for student learning is a new and exciting field to explore. Continued studies are needed to help identify the most productive ways and times to implement this new technology in nursing curricula.	While it is difficult for our faculty to face the disparity which arose in deciding whether or not to pass Anne, the student in this case study, many important points were raised which strengthened the evaluation process particularly in the case of the borderline student.

	to influence students' decision making and help students understand how to share power with, rather than relinquish power to, the patient. Future research is required to fully understand the issue of student decision making and how we, as nurse educators, can facilitate and enhance this skill.		
Strengths/ Limitations		A limitation of the HPS is that only a few students are effectively accommodated at a time. Intravenous medications were the only choice available on the HPS6. This meant that morphine and meperidine were the only pain medications students could choose to give. In addition, there was no comparison group and no pretest or posttest to determine exactly what was learned in the simulation experience. No attempt was made to measure the effects of the session, other than to have the students respond to the survey questions.	
Funding Source	None noted	None noted	None noted
Comments	Clinical decision making - faculty facilitating and enabling this methodology beginning in the lab.	Simulation, in conjunction with clinical experiences, is very effective.	Importance of inter-rater reliability with student assessment, especially borderline students.

Article Title and Journal	**Comparing self-guided learning and educator-guided learning formats for simulation-based clinical training**	**The assessment of student nurse learning styles using the Kolb Learning Styles Inventory Nurse Education Today**	**Prospective Randomized Trial of Simulation Versus Didactic Teaching for Obstetrical Emergencies**
Author/Year	Brydges,R., Carnahan, H., Rose, D. & Dubrowski, A. (2010). Comparing self-guided learning and educator-guided learning formats for simulation-based clinical training. *Journal of Advanced Nursing online publication*. doi: 10.1111/j.1365-2648.2010.05338.x	Cavanagh, S., Hogan, K., Ramgopal T. (1995). The assessment of student nurse learning styles using the Kolb learning styles inventory. *Nurse Education Today, 15 (3): 177-183.*	Daniels, K., Arafeh, J., Clark, A., Waller, S., Druzin, M., & Chueh, J. (2010). Prospective randomized trial of simulation versus didactic teaching for obstetrical emergencies. *Simulation in Health Care 5*(1) 41-45. doi: 10.1097/SIH. 0b013e3181b65f22
Database and Keywords	CINAHL with Full Text Clinical training, educator-guided learning, nurse education, proficiency-based training, self-assessment, self-directed learning, simulation	ERIC Cognitive Style; Experiential Learning; Higher Education; Measures (Individuals); Nursing Education; Research Problems	OVID simulation versus didactic teaching, obstetric emergency team training, obstetrical emergency training
Research Design	RCT, four-arm experimental design	Questionnaire analysis	RCT
Level of Evidence	II	VI	II
Study Aim/Purpose	The authors tested the over-arching hypothesis that progressive self-guided learning offers equivalent learning benefit vs. proficiency-based training while limiting the need to set proficiency standards.	Investigating methods of maximizing learning potential for pre-registered nursing students.	To determine whether simulation was more effective than traditional didactic instruction to train crisis management skills to labor and delivery teams
Population Studied/Sample	According to a computer-generated randomization list, a	192 Registered general nursing/DipHe students	The study population consisted of labor and delivery nurses from

Size/Criteria/Power	sample of 60 fourth year nursing students was equally distributed to the four intervention groups (proficiency-based, progressive, yoked control and open-ended). Randomization was stratified by participant sex. Only six participants were male; they were assigned equally to the four groups.		one institution, Lucile Packard Children's Hospital, with >1 year and < 5 years of labor and delivery experience and obstetric residents from two institution: Stanford University Medical Center and Santa Clara Valley Medical Center with no > 5 years of labor and delivery experience
Methods/Study Appraisal/Synthesis Methods	The students practiced intravenous catheterization using simulators that differed in fidelity (i.e. students' perceived realism). Data were collected in 2008. Proficiency-based students advanced from low to mid to high-fidelity after achieving a proficiency criterion at each level. Progressive students self-guided their progression from low to mid to high-fidelity, Yoked control students followed an experimenter-defined progressive practice schedule. Open-ended students moved freely between the simulators. One week after practice, blinded experts evaluated students' skill transfer on a standardized patient simulation. Group differences were examined using analyses of variance.	The students were the K-LSI (II) and a questionnaire to gain information about a variety of demographic and biographic details. Students were administered the questionnaires within the first week of training before any formal teaching had commenced. The K-LI (II) consists of 12 questions in which respondents try to describe their learning style.	Both groups were taught management for shoulder dystocia and eclampsia. The simulation group received 3 hours of training in a simulation laboratory, the didactic group received 3 hours of lectures/videos and hands-on demonstration. Subjects completed a multiple choice questionnaire before training and before testing. After 1 month all teams underwent performance testing as a labor and delivery drill. All drills were video recorded. Team performances were scored by a blinded reviewer using the video recording and an expert-developed checklist. The data were analyzed using independent samples. Student t test and analysis of variance (one way). P value of $\leq$ .05 was

			considered to be statistically significant.
Primary Outcome Measures and Results	Proficiency-based students scored highest on the high-fidelity post-test (effect size 1.222). An interaction effect showed that the Progressive and Open-ended groups maintained their performance from post-test to transfer test, whereas the Proficiency-based and Yoked control groups experienced a significant decrease (P<.05), Surprisingly, most Open-ended students (73%) chose the progressive practice schedule.	The percentage of students having predominantly concrete learning style was 53.7%, while 46.3% were predominantly reflective.	There was no statistical difference found between the groups on the pretraining and pretesting multiple-choice questionnaire scores. Performance testing performed as a labor and delivery drill showed statistically significant higher scores for the simulation-trained group for both should dystocia eclampsia management
Author Conclusions/ Implications of Key Findings	Progressive training and proficiency-based training resulted in equivalent transfer test performance, suggesting that progressive students effectively self-guided when to transition between simulators. Students' preference for the progressive practice schedule indicates that educators should consider this sequence for simulation-based training.	These findings have reinforced the need for using a variety of delivery styles with students, with an emphasis on participation and experiential learning. This need for variety is essential given the distribution of learning styles found with the students.	In an academic training program, didactic and simulation-trained groups showed equal results on written test scores. Simulation-trained groups showed equal results on written test scores. Simulation-trained teams had superior performance scores when tested in a labor and delivery drill. Simulation should be used to enhance obstetrical emergency training in resident education.
Strengths/ Limitations	Ratings from two experts were used to establish a single item intraclass correlation coefficient of 0.69 and 0.67 for the global	There remain a number of problems with the K-LSI (II). As a research instrument it does not	The main limitation of this study is the low response rate to the post-registration survey which impacts on reliability so care must

	rating scale, checklist, and the integrated procedural performance instrument rating respectively. Limitations: The authors cannot generalize the findings beyond learning of IV catheterization to more complex clinical skills. In terms of study replication, they had access to many simulator resources that may not be available at all institutions. They selected performance time as the proficiency criterion for practical purposes; however, time may not be the best predictor of proficient performance. The outcomes associated with self-guided practice were not compared to practice with an educator physically present during the session. Thus, this study does not demonstrate the comparative efficacy of self-vs. other guidance.	allow for differentiation between various elements in the target population in any consistent manner.	be taken when comparing the groups. The response rate may have been influenced by mailing surveys to the family home when the respondents may be living elsewhere and poor response rates to postal surveys generally (Ryan et al., 2006 D. Ryan, P. Mannix McNamara and C. Deasy, Health Promotion in Ireland: Principles, Practice and Research, Gill and Macmillan, Dublin (2006).Ryan et al., 2006). However the study provides an insight into how pre-registration student perceptions and expectations regarding their role as a registered nurse compare with the reality of practice post-registration. The findings of this study could be further enhanced through using a mixed method study incorporating interviews, allowing greater exploration of the participants' experiences of the transition.
Funding Source	Supported by a grant from the Natural Sciences and Engineering Research Council (NSERC).	None noted	None noted
Comments	Success of progressive simulation and student self-guided learning - THE BASIS FOR MY STUDY	Need for a variety of teaching techniques including student participation and experiential learning	Simulation vs traditional methods of teaching skills - simulation is better and quicker

Article Title and Journal	**An exploratory study of role transition from student to registered nurse (general, mental health and intellectual disability) in Ireland. Nurse Education in Practice**	**From competence to capability: a study of nurse practitioners in clinical practice Journal of Clinical Nursing**	**Stress, coping and satisfaction in nursing students Journal of Advanced Nursing**
Author/Year	Deasy, C., Doody, O. Tuohy, D. (2011). An exploratory study of role transition from student to registered nurse (general, mental health and intellectual disability) in Ireland. *Nurse Education in Practice, 11* (2), 109-113.	Gardner, A., Hase, A., Dunn, S. V., & Carryer, J. (2007). From competence to capability: A study of nurse practitioners in clinical practice. *Journal of Clinical Nursing, 17*, 250- 258. doi: 10.1111/j.1365- 2702.2006.01880.x	Gibbons, Cl., Dempster, M., & Moutray, M. (2010). Stress, coping and satisfaction in nursing students. *Journal of Advanced Nursing 67*(3), 621-632. Advance online publication. doi:10.1111/j.1365-2648.2010.05495.x
Database and Keywords	CINAHL with Full Text Student nurse, transition to clinical, study	CINAHL with Full Text Competence , capability, competence, education, nurses, nursing, skill	Academic Search Premier Self-efficacy, satisfaction, stress; multiple regression analysis, well-being
Research Design	Quasi-experimental study with a cohort	Secondary (deductive) Analysis	Qualitative
Level of Evidence	III	II	VI
Study Aim/Purpose	The aim of this study was to explore the transition from student to registered nurse in a cohort who had a substantial rostered internship in the final year of their programme. A core	This research aimed to understand the level and scope of practice of the nurse practitioner in Australia and New Zealand further using a capability framework	To explore the relationship between sources of stress and psychological well-being and to consider how different sources of stress and coping resources might function as moderators and

	objective of the study was to compare pre-registration student perceptions and expectations regarding their role as a registered nurse, with the reality of practice, six months post-registration.		mediators on well-being.
Population Studied/Sample Size/Criteria/Power	Fourth year student nurses (n = 116) registered on BSc nursing programmes (mental health, general and intellectual disability) within a Department of Nursing and Midwifery in an Irish university. The total number of pre-registration respondents was 98 (84%) and post-registration respondents was 21 (22%). Most (95%) of the respondents to both surveys were female.	Fifteen nurse practitioners	A convenience sample of 280 nursing students were invited to take part by the lead researcher at the start of a course lecture and 171 (61%) consented. The inclusion criteria were students from all nursing specialities in one institution in the final year of their programme. For age, there were 15 missing values and for gender 20 missing values. For the remaining participants, 32% (n = 50) were under 21; 40% (n = 62) were 22–30; 23% (n = 36) 31–40 and 5% 41–50 (n = 8); and 87% were women (n = 136) and 9% were men (n = 15).
Methods/Study Appraisal/Synthesis Methods	Data were collected over two phases. In phase one, fourth year student nurses (n = 116) registered on BSc nursing programmes (mental health, general and intellectual disability) within a Department of Nursing and Midwifery in an Irish university, were asked to complete a pre-registration	Fifteen nurse practitioners were interviewed. A secondary (deductive) analysis of interview data using capability as a theoretical framework was conducted	A questionnaire was administered to 171 final year nursing students in 2008. Questions were asked to measure sources of stress when rated as likely to contribute to distress (a hassle) and rated as likely to help one achieve (an uplift). Support, control, self-efficacy and coping style were also measured, along with their

	survey. In phase two, those from the original sample who met the inclusion criteria of being registered for six months (n = 96) were asked to complete a post-registration survey. The wording of the survey instruments were the same except for changes in tense e.g. "I will be supported" became "I am supported".		potential moderating and mediating effects on well-being, operationalized using the General Health Questionnaire and measures of course and career satisfaction.
Primary Outcome Measures and Results	The main areas for discussion arising from the findings are: expectations of feedback and support; confidence in clinical abilities; stress and participation in direct patient/client care. Despite confidence with clinical abilities, a minority of pre-registration respondents was not confident in their level of knowledge. This may be attributed to the fact that they had not fully completed the theoretical component of their programme when surveyed. However, these opinions shifted post-registration when respondents were confident with their knowledge. This may be due to the completion of the mandatory practice placement element of the programmes as well as the linkage between	The analysis showed that capability and its dimensions is a useful model for describing the advanced level attributes of nurse practitioners. Thus, nurse practitioners described elements of their practice that involved: using their competences in novel and complex situations as well as the familiar; being creative and innovative; knowing how to learn; having a high level of self-efficacy; and working well in teams.	Sources of stress likely to lead to distress were more often predictors of well-being than were sources of stress likely to lead to positive, eustress states, with the exception of clinical placement demands. Self-efficacy, dispositional control and support were important predictors, and avoidance coping was the strongest predictor of adverse well-being. Approach coping was not a predictor of well-being. The mere presence of support appeared beneficial as well as the utility of that support to help a student cope.

	theory and practice through lectures, tutorials and clinical skills laboratories. The respondents of this survey (pre-registration) anticipated the transition would be stressful. However, as the transition was less stressful and less problematic than expected, their concerns were not actually realized. This supports Brown & Edelmann's (2000) assertion that many students and registered nurses perceive more potential problems than they experience in practice. Nevertheless, given that many of the respondents reported stress in relation to their anticipated role there is a need to ensure that supportive measures are available to help reduce transition stress (O'Shea and Kelly, 2007). Respondents in this study report spending more time providing direct patient/client care than anticipated.		
Author Conclusions/ Implications of Key Findings	This study reaffirms that transition by its nature is stressful, indicating the need for the development of coping skills pre-registration. This may be addressed by the inclusion of a formal stress management	This study suggests that both competence and capability need to be considered in understanding the complex role of the nurse practitioner.	Initiatives to promote support and self-efficacy are likely to have immediate benefits for student well-being. In course reviews, nurse educators need to consider how students' experiences might contribute not just to potential

	component within undergraduate programmes. While it is acknowledged that there are informal supports available post-registration, a more uniform support system is recommended, to include staff induction, orientation, feedback and preceptorship. The rostered internship is a new development in undergraduate nurse education in Ireland. Research on this initiative and its role in facilitating the transition from student to registered nurse is warranted. The difference between respondents' expectations and the reality of practice suggests a need for more dialogue between graduates, educators and service providers regarding the role of the graduate		distress, but to eustress as well.
Strengths/ Limitations	The overall number of trainees was very limited. There was an uneven experience level drop out of participants, which may have biased the results. All of the participants were relatively inexperienced, so it is unknown whether the same effect would exist if simulation training was given to seasoned providers. The teams during the performance	Secondary analysis is an efficient and cost effective use of researcher time. It also reduces respondent burden. The main limitations are lack of control over data collections methods and the potential for bias or other problems in initial data collection. Neither limitation is relevant to this project as the same research team undertook both the primary and secondary analysis.	There were some limitations to the study. It relied on self-reported responses and respondents were final-year students. They were selected because they had more academic and clinical experience to draw on, but that very experience would be likely to affect their appraisals and responses compared with students earlier in

	testing were identical to the teams during the Sim interventions. Therefore, there exists the potential effect of increased intrateam familiarity in the Sim group. Whether this team familiarity alone is the basis for the improved performance is no clear. Another limitation was the use of only one professional evaluator. For simulation in general, there is the concern of whether testing performance in a simulated setting, however "life-like" reflects skills in an actual clinical event.	Secondary analysis is often deductive inquiry and as such is open to the trap of the findings being made to fit the framework. Although all researchers contributed to both analyses, different researchers took primary responsibility for each phase, thus providing greater rigor.	their studies. A longitudinal methodology, beginning with first year students, would negate this problem and the weaknesses associated with the cross-sectional design used here.
Funding Source	None noted	Sponsored by the Australian Nursing and Midwifery Council and the Nursing Council New Zealand.	This study was not supported by any external funding and there are no conflicts of interest
Comments	Supporting the student transitioning from student to RN	Difference between competency and capability	Initiatives to promote self-efficacy; importance of considering student's previous experiences
Article Title and Journal	**The effect of classroom simulation on nursing student's self-efficacy related to health teaching; Journal of Nursing Education**	**Application of pharmacology knowledge in medication management by final year undergraduate nursing students A Journal for the Australian Nursing Profession**	**Clinical decision-making n senior nursing students in Iran International Journal of Nursing Practice**
Author/Year	Goldenberg, D., Andrusyszyn, M., & Carrol, I. (2005). The effect of classroom simulation on	Honey, M., Lim, A. G. (2008). Application or pharmacology knowledge in medication	Farezeh, J., Farkhondeh, S., Salsali, M., Kaveh, M., & Williams, L. (2010). Clinical

	nursing students' self-efficacy related to health teaching. *Journal of Nursing Education 44*(7), 310-314.	management by final year undergraduate nursing students. *Contemporary Nurse: A Journal for the Australian Nursing Profession, 2008 Aug; 30* (1), 12-9.	decision-making in senior nursing students in Iran. *International Journal of Nursing Practice.* doi: 10.1111/j.1440-172X.2010.01886.x
Database and Keywords	CINAHL with Full Text Education, Nursing, Baccalaureate; Health Education; Self-Efficacy; Simulations; Students, Nursing, Baccalaureate; Adult: 19-44 years; Female	CINAHL with Full Text Drug Administration; Education, Clinical; Education, Nursing, Baccalaureate; Pharmacy and Pharmacology; Student Knowledge; Students, Nursing, Baccalaureate	CINAHL with Full Text Students, Nursing; Decision Making, Clinical; Decision Making, Clinical; Adult: 19-44 years; Male; Female
Research Design	Descriptive study	Qualitative descriptive study	Qualitative
Level of Evidence	V	V	V
Study Aim/Purpose	The purpose of this descriptive study was to investigate the effect of classroom simulation on third-year baccalaureate nursing students' self-efficacy in health teaching.	The purpose of this qualitative descriptive study was to explore final year undergraduate nursing student's perception of clinical practice situations where they applied, or were not able to apply, their pharmacology knowledge in medication management.	The aim of this study was to investigate the factors facilitating and inhibiting effective clinical decision-making for senior level Iranian nursing students
Population Studied/Sample Size/Criteria/Power	A nonprobability, convenience sample was obtained from a population of 66 third year, full-time and part-time BScN students enrolled in a university located in southwestern Ontario, Canada. All 22 participants were female, generic baccalaureate students, and 86% were younger	The context of the present study is a university-based School of Nursing that utilizes an integrated curriculum approach. Sixty surveys were distributed and 54 students responded giving a response rate of 90%.	Purposeful and theoretical sampling was used according to the codes and categories as they emerged. All the senior nursing students completing their last semester of course work in baccalaureate programme were considered as potential participants. 32 students (31

	than age 25. The remaining participants ranged in age from 25 to 29. Twenty-one (96%) indicated they were studying full time. Ten (46%) noted they had nursing experience in addition to that in the program, mostly as nursing aides, and 8 (36%) had additional postsecondary education other than nursing. Fourteen (64%) estimated they had already provided 3 to 10 hours of patient teaching. Respondents disclosed they had either an A or B average. These characteristics were similar to those of the total group (N = 66).		women, 1 man) participated in the focus groups. Their age ranged 22–28 years. The students had no previous degree in nursing or experience with patients apart from the clinical rotations for each nursing course. To complete the clinical requirements of the students were assigned to complete a capstone 3 week clinical rotation across several wards in the two major hospitals affiliated to Shiraz University of Medical Sciences. A clinical instructor was allocated seven students and the students were assigned one patient each day (6 h) for 5 days per week.
Methods/Study Appraisal/Synthesis Methods	Case study and role play simulations were combined in a workshop setting for students in a 13-week course entitled Professional Issues II: Teaching and Learning. Students were to assess the clients' learning needs and developmental stage, and propose a teaching plan using Bandura's (1977, 1986) theory. Each group of 4 to 5 students chose at least two of the five cases distributed. Individual group members role played a character (e.g., nurse, client,	In 2006, after completion of their final clinical placement all students in the class were invited to participate in a study and complete an anonymous survey. The survey consisted of two open-ended questions and students were asked to reflect on their ten week clinical placement and answer the questions: 'Please describe situations where you have used your pharmacology knowledge' and 'Please identify barriers to using your pharmacology knowledge'. Completed surveys underwent	An exploratory qualitative approach using grounded theory methods was used to investigate the perceptions of Iranian baccalaureate nursing students regarding the important factors facilitating and inhibiting clinical decision-making within the context of the educational and practical setting. This approach was selected as there was no desire to develop a substantive theory as the study was limited in scope and sample. The qualitative approach allows researchers to

	family member, observer, coach) and assumed a different role for each case. Students then analyzed the case, recording and sharing observations and insights based on theories learned in class. While students role played the cases, the faculty circulated, asked pertinent questions, corrected misconceptions, and supported deliberations. The faculty and students' classmates critiqued the groups' decision-making and interpersonal skills. Additional feedback was generated by summarizing important points and offering constructive suggestions in a final debriefing session with the entire class.	content analysis for identifying categories and themes.	access the inner experience of participants to determine how meanings are formed through and in culture in this case the culture of the clinical learning environment.15 Grounded theory reflects the concept that theory emerging from this type of research is grounded in the data and although there was no intent of developing a theory, the outcomes were data saturated.16 Clinical decision-making is a process rather than a static factor, so grounded theory methods provided an ideal approach.17 In addition, student nurses practice in multidisciplinary teams and as the grounded theory approach focuses on identification, description and explanation of interactional processes between and among individuals or groups within a given social context, this too strengthened the rationale for using this approach.
Primary Outcome Measures and Results	Three research questions concerning third-year BScN students were posed: ● What are the differences in mean self-efficacy scores before and after participating in simulated health teaching	This study reports student perceived lack of confidence in relation to using their pharmacological knowledge. There are two factors within this, one related to the academic preparation of students and another concerning a lack of	Four themes were identified from the data as important factors in nursing students' clinical decision-making. These included: clinical instructor incompetence, low self-efficacy, unconducive clinical learning climate and

	(assessment, planning, implementation, and evaluation) through case study and role play? ● What are the relationships between self-efficacy scores and selected demographic variables (i.e., age, gender, student status, years in program, grade point average, nursing experience, postsecondary education, hours of health teaching in clinical area)? ● What ratings do students' ascribe to the effectiveness of case study and role play simulation as a teaching method? Following the simulation experience, students' self-efficacy scores were significantly higher ($p = .001$), reflecting greater overall confidence related to health teaching (mean = 3.55) after participating in the workshop than before (mean = 2.96). Significant differences ($p < .001$) were also found between students' pretest and posttest scores for the assessment, implementation, and evaluation phases of health teaching. Self-efficacy scores for planning were unchanged, possibly due to	confidence in retaining and being able to apply pharmacology knowledge. Students in the present study described feeling 'overwhelmed' by the amount of information, including pharmacology related information.	experiencing stress.

	insufficient time to consider and implement a teaching plan. Regarding the second research question, no significant relationships were found between students' health teaching scores and selected demographic variables using Pearson's correlation (r), despite slight differences in respondents' characteristics. The lack of correlation may be explained by the small sample. For the third research question, descriptive statistics (frequencies) were used to rate students' ratings of the effectiveness of simulation as a teaching method. More than half of the students rated the simulations as effective, while slightly more than one third rated them as very effective.		
Author Conclusions/ Implications of Key Findings	Simulation as a teaching method to increase students' perceptions of self-efficacy related to health teaching was supported. Significant increases in students' self-efficacy scores after the workshop were found regarding combined phases of health teaching (total), and regarding the assessment, implementation, and evaluation phases. Students'	The challenge for the nurse Educator is to create opportunities for students to practice integrating and applying the knowledge and skill required for their role as new graduate nurses. The majority of the barriers found in this study were linked to the clinical context. Therefore opportunities to improve communication between the educational and clinical setting will	The findings of this study increase the body of knowledge and understanding of the factors influencing nursing students' clinical decision-making. According to these participants, qualified clinical instructors in a conductive learning climate facilitate effective clinical decision-making. These findings could be used by statutory bodies

	active participation in role-playing case studies is a useful strategy to increase their confidence for health teaching. This simulation strategy can also be applied to enhance other learner behaviors.	be sought. In conjunction, a workbook will assist the student focus their pharmacology knowledge to their clinical practice. Concurrent to these strategies a curriculum review will be undertaken. Students will be encouraged to focus their learning on fundamental pharmacological principles which will provide a sound knowledge base for medication management and future practice as an RN.	responsible for the regulation of practice and nursing education to reform curricula, and to strengthen standards of nursing education. In order to facilitate the transfer of theoretical knowledge into practice, the following points are recommended: (i) Providing ongoing education to staff to expose them to best practice standards of nursing care and orient them to the most effective learning role of student nurses in the ward. (ii) Requiring a minimum 5 years of clinical experience for new teachers before being accepted into a faculty role and maintain clinical competence through practice on a regular basis, for example, 1 day per week. (iii) Designing ongoing education for clinical teachers in clinical specialty areas. (iv) Establishing strong relationships between faculty and clinical staff in the planning and maintaining the best learning environment for the students. (v) Planning and implementing simulated-based education for nursing students where clinical decision-making can occur in a less risk-laden

			environment.
Strengths/ Limitations	The small, nonprobability convenience sample in one setting provided little opportunity to control for bias, prohibited interpretation of possible correlations, and limited generalizability of the findings. Administering the questionnaires at an inconvenient time in the semester and requesting students to describe their self-efficacy perceptions from both before and after participating in the workshop at the same time could have resulted in the low response rate and raises some doubt about the students' perceived differences in self-efficacy. Therefore, the results of this study should be viewed with caution.	Pharmacology knowledge is likely to be further developed in practice when the student is beyond the constraints of the student role and practicing as a RN. Therefore we suggest repeating this study with RNs after their first year of practice, when they will have had the opportunity to consolidate their knowledge in practice	Homogeneity of the senior nursing students as the sample is one limitation of this study. Research involving divergent groups of nursing students at different levels of nursing education would increase the understanding of influential factors in clinical decision-making. Also replicating this study with different geographic populations and in different contexts will increase the knowledge regarding development of nursing students' clinical decision-making.
Funding Source	None noted	None noted	None noted
Comments	Effectiveness of utilizing simulation to increase self-efficacy	Application of knowledge and transitioning from education to clinical - providing/encouraging a sound knowledge base of medication management	Clinical decision making support; relationships between student and faculty.
Article Title and Journal	**Look before you leap: lessons learned when introducing clinical simulation**	**Critical thinking: impact on nursing education Journal of Advanced Nursing**	**The Relationship Between Simulation in Nursing Education and Medication**

	Nurse Educator		**Safety** **Journal of Nursing Education**
Author/Year	Jarzemsky, P. A. & McGrath, J. (2008). Look before you leap: Lessons learned when introducing clinical simulation. *Nurse Educator 33*(2), 90-95. doi: 10.1097/01.NNE.0000299513.78270.99	Jones, S. & Brown, L. (1991). Critical thinking: impact on nursing education. *Journal of Advanced Nursing Education* 16, 529-533	Sears, K., Goldsworthy, S., & Goodman W. (2010). The relationship between simulation in nursing education and medication safety. *Journal of Nursing Education, 49* (1), 52-5.
Database and Keywords	CINAHL with Full Text Confidence; Critical Thinking; Decision Making, Clinical; Education, Clinical; Education, Nursing, Baccalaureate; Nursing Skills; Simulations; Stress, Psychological	CINAHL with Full Text Critical Thinking; Education, Nursing; Nursing Science; Deans, Academic; Faculty Attitudes	CINAHL with Full Text Clinical Competence; Medication Errors; Patient Simulation; Students, Nursing, Baccalaureate; Teaching Methods
Research Design	Systemic Review	Descriptive Study	Experimental Study
Level of Evidence	I	V	II
Study Aim/Purpose	The purpose of this study was to compare nursing students' self-reported assessment of confidence, ability, stress, and critical thinking before and after they participated in a low-fidelity clinical simulation. The aim was to explore the potential benefits of simulation, as why deliberated about their use of simulations strategies.	The purpose of this study was to characterize critical thinking as it is currently interpreted in nursing education programs. The objectives were fivefold: 1) To define the concept of critical thinking; 2) To describe the characteristics of critical thinking activities; 3) To identify components of critical thinking; 4) to identify faculty preparation for teaching critical thinking; 5) to describe strategies employed to teach critical thinking.	This experimental study examined whether the use of clinical simulation in nursing education could help reduce medication errors.

		It was hypothesized that critical thinking would be interpreted and implemented as a process of reductionistic, linear problem-solving techniques.	
Population Studied/Sample Size/Criteria/Power	85 baccalaureate nursing students near the end of their first clinical course	Deans or directors of National League for Nursing accredited baccalaureate and higher-degree programs in the United States were sampled by mailed surveys	Fifty-four student volunteers were randomly assigned to an experimental (treatment) group (24 students) or a clinical control group (30 students). The treatment replaced some early-term clinical placement hours with a simulated clinical experience. The control group had all normally scheduled clinical hours. Treatment occurred prior to opportunities for medication administration. Participants in this study were second-year bachelor of science in nursing (BScN) students, scheduled for placement in medical surgical or maternal child field environments
Methods/Study Appraisal/Synthesis Methods	Students were pre-tested, underwent the simulations, the experimental group underwent the simulation and then did a post-test. The control group was not reassessed.	A total of 470 surveys were mailed to the dean or director of each identified National League for Nursing accredited baccalaureate and higher-degree programs in the United States. Return of the completed instruments was interpreted as agreement to participate in the study. The return rate on this national sample was	To assess the effectiveness of these laboratories, a randomized control study was conducted to test whether a simulation-based educational intervention can in fact contribute to the success of new nurses in overcoming the risks of error and increase their safety in medication administration. Two types of

		51%. Two hundred and twenty-five usable questionnaires were included in the study. Data were analysed using descriptive statistics. Concepts which have been associated with critical thinking were presented to respondents who were asked to identify those which, in their estimation, represented critical thinking. Terms associated with critical thinking processes were presented to respondents in the same way. Respondents were asked to list teaching strategies which were consistent with critical thinking concepts and processes. They were also asked how their faculties learned to think critically and how they promoted critical thinking among student. Selected demographic variables were included to provide information such as the types and sizes of the respondents' programs and the backgrounds of the respondent deans and directors.	errors were reported: actual medication administration errors and potential medication administration errors. The study used a randomized control group, posttest-only design. The data collection instrument was adapted from a survey developed by one of the authors (K.S.) in 2006.Clinical instructors completed one form for each medication error (or near-miss) that was observed.
Primary Outcome Measures and Results	A comparison of pretest and posttest survey data indicated significantly higher self-ratings for confidence, ability, stress, and critical thinking related to the skills of urinary catheterization, sterile dressing change, IV	Congruent with the hypothesis, the predominant model in baccalaureate nursing education in the US is predicated on critical thinking as a problem-solving activity. Though respondents felt that critical thing was integrated into their programs,	There was compelling evidence that collectively, students in clinical placement generate fewer medication errors if they have had prior exposure to a related, simulation-based experience.

	medication administration, and NG medication administration after participation in the clinical simulation.	their interpretation of the concept was narrowly defined and often contradictory.	
Author Conclusions/ Implications of Key Findings	These results suggest that even low-fidelity clinical simulation seems beneficial and affirm the assertion of Rhodes and Curran that students gain confidence in their ability and decision making and feel less stressed about performing skills when given opportunities to practice. Although sophisticated manikins and prepared scenarios are available for a price, nursing faculty should not allow their budget to limit exploration of simulation as a teaching strategy.	The apparent confusion in defining and utilizing critical thinking skills indicates that nurse educator in this sample were unclear about the mechanisms or operation of critical thinking. While the education of students is admittedly not a one-item agenda, the issue of critical thinking development is urgent. Critical thinking can give nursing a lifeline into the future development of the discipline.	This study adds to the knowledge in the area of simulation education in nursing, and its findings suggest that simulation education may contribute to a reduction in medication errors among novice nurses. The study further identifies areas for further investigation in the area of simulation and patient safety and recommends that the study be replicated on a larger scale.
Strengths/ Limitations	The authors state that there were several limitations to their study. "Because we did not resurvey students who had not participated in the simulation, our ability to generalize that improvements in self-assessments were a direct result of participation in the simulation exercise is limited. Furthermore, our design did not address whether there is a transfer of skills into the clinical practice setting. We recognize that a longitudinal study is needed to		Although both groups were randomly assigned students, the two groups came from one collaborative nursing program; thus the results may not be generalizable to all nursing programs. Two community hospitals were used in this study to provide the clinical placements; therefore, one of the hospital medication systems may have been more user friendly for the students than the other because it used unit dose. The

	examine learning outcomes at subsequent points in nursing school and after graduation.		necessity that different student groups had different clinical instructors could also potentially bias the reporting of the errors. To further validate this study, it should be replicated on a larger scale. It would be useful to explore for clusters among contributing factors for errors, as well as to explore whether there are interactions between the clusters and the types of errors.
Funding Source	None noted	None noted	None noted
Comments	Effectiveness of simulation based on self-ratings by students	Critical Thinking	Simulation in medication administration can decrease medication errors.
Article Title and Journal	**Nursing Students' Perceptions of Anxiety-Producing Situations in the Clinical Setting Journal of Nursing Education**	**Integration of patient care simulators into the nursing curriculum can enhance a student's ability to perform in the clinical setting Dean's Note**	**Clinical Faculty Influences on Student Caring Self-Efficacy International Journal for Human Caring**
Author/Year	Kleehammer, K., Hart, L., & Kleck, J. (1990). Nursing students' perceptions of anxiety-producing situations in the clinical setting. *Journal of Nursing Education 29* (4), 183-187.	Kovalsky, A. & Swanson, R. (2004). Integration of patient care simulators into the nursing curriculum can enhance a student's ability to perform in the clinical setting *Dean's Notes, May; 25* (5), 1-3.	Livsey, K. R. (2009). Clinical faculty influences on student caring self-efficacy. *International Journal for Human **Caring**, 13* (2), 52-58.
Database and	CINAHL with Full Text	CINHAL with Full Text	CINAHL with Full Text

Keywords	Students, Nursing; Student Attitudes; Anxiety; Learning Environment, Clinical; Adult: 19-44 years; Male; Female	Education, Clinical; Education, Nursing; Patient Simulation	Caring; Faculty, Nursing; Faculty-Student Relations; Leadership; Self-Efficacy; Students, Nursing, Baccalaureate; Adult: 19-44 years
Research Design	Single-descriptive study	Evaluation of a project	Non-experimental, explanatory study
Level of Evidence	VI	VII	IV
Study Aim/Purpose	The purpose of this study was to identify specific clinical situations which were anxiety-producing for junior and senior nursing students.	This paper described a project of integrating the Patient Simulator into the entry-level nursing courses, Foundations of Nursing in a Community college	To examine and describe the relationships between students' perceptions of (a) structural empowerment in the clinical learning environment, (b) leadership behaviors of clinical faculty, and (c) student caring self-efficacy
Population Studied/Sample Size/Criteria/Power	The convenience sample consisted of 39 junior and 53 senior nursing students from a small baccalaureate program located in a large Midwestern city. The data were collected over a 4 year period. During that time, one faculty member changed, but no curricular or major clinical experiential changes were noted. The student were 98% female and ranged in age from 19 to 38 years (Mean = 22)	Entry level nursing students at Valencia Community College	Participants were recruited from a randomly selected list of 1,000 members of the National Student Nurses Association who were (a) enrolled in baccalaureate nursing programs across 16 southern states of the United States and (b) with 2006 as the reported year of graduation. Only students who were enrolled in baccalaureate nursing programs (traditional or accelerated) were eligible for participation in the study.
Methods/Study Appraisal/Synthesis Methods	The tool used for data collection was the "Clinical Experience Assessment Form". A Likert	Students were videotaped performing a simulation and this footage was used as a tutorial follow	Conditions of Learning Effectively Questionnaire - The 30-item instrument includes

	format was utilized with a 5 point range, 5 being strongly agree and 1 being strongly disagree. All data were collected in a classroom setting during the second semester of the school year. All students had clinical experiences in obstetrics, pediatrics, community health, and therapeutic communication. In addition, seniors had experiences in the adult medical surgical areas and adult mental health facilities. There was one open-ended question to identify what had been the most anxiety-producing aspect of their clinical experience.	up to three interactive laboratory experience.	seven subscales, each rated on a 5-point Likert-type scale. These include five subscales measuring elements of structural empowerment, one-item subscale measuring psychological empowerment, and one four-item subscale measuring global empowerment. The construct of self-efficacy was measured using the Caring Effectiveness Scale (CES) by Coates (1997). The instrument explores the concept of self-efficacy as it relates to nurses' perception of their ability to develop caring relationships in the delivery of nursing care. The CES is a 30-item self-report instrument. The Leadership Practices Inventory-Observer (LPI-O) was used to measure the concept of nursing leadership. The LPI-O was developed and revised by Posner and Kouzes (1988) and provides scores on five factors: Challenging the Process, Inspiring a Shared Vision, Enabling Others to Act, Modeling the Way, and Encouraging the Heart. Students were surveyed after recent completion of their BSN program.

Primary Outcome Measures and Results	The highest levels of anxiety expressed by students concerned the initial clinical experience on a unit and fear of making mistakes. Clinical procedures, hospital equipment, talking with physicians, and being late were identified but the students as producing anxiety. Faculty observation and evaluation were also indicated as situations that promoted student anxiety.	The majority of the students completing a follow-up survey felt that the interactions were a learning experience. A few noted that they would have liked to interact with the patient simulator on a one-to-one basis rather than in a group but time constraints have prohibited this.	Nursing leadership was significantly correlated with student perceptions of structural empowerment in the clinical environment in the full sample ($r = .658$, $p = .000$) as well as both low ($r = .547$, $p = .000$) and high ($r = .394$, $p = .000$) leadership groups, thus demonstrating the important influence of the clinical instructor on student learning environments Student perceptions of structural empowerment and caring self-efficacy were found to be positively correlated, although not significant. Study results found positive correlations between variables within the full sample, but different relationships were found to exist between selected variables based upon student perceptions of nursing leadership provided by clinical faculty. A low but positive correlation was found between nursing leadership and self-efficacy.
Author Conclusions/ Implications of Key Findings	It is not anticipated that all anxiety that students experience can be relieved, but if clinical learning is to be facilitated, anxiety must be kept at a moderate level. Nursing educators	The authors feel that through the use of well -planned and thoroughly developed, focused patient scenarios, their students' ability to think critically and apply didactical theory has been strengthened.	Findings from this study indicate the need for faculty to examine their behaviors to identify uncaring behaviors being modeled in nursing education. While this study provided

	need to continue to examine what are anxiety-producing situations for the clinical student, and what interventions can be instituted to decrease that anxiety. Recommendations for additional studies include longitudinal studies to determine if student clinical anxiety changes over time and in what ways. Interventions that can contribute to decreased student anxiety of the first experience on a unit need to be studies. Finally, faculty teaching techniques need to be examined, so that those seen by students as supportive can be encouraged as interventions to decrease student anxiety in the clinical setting.		preliminary evidence of the relationship between student perceptions of leadership behaviors demonstrated by clinical nurse faculty and caring self-efficacy of nursing students, additional research is needed to better understand how the combination of environmental and personal factors influence these and other behavioral outcomes. This study provides new insights into the combination of factors that may influence development of caring behaviors among future nurses. Findings from this study could assist nurse educators in designing more effective learning experiences for student nurses to better facilitate the transition of individuals from student nurses to professional registered nurses, thus enhancing the impact of professional nursing on healthcare delivery and the healthcare environment.
Strengths/ Limitations		While the majority of the students felt that the interactions were a learning experience, a few noted that they would have liked to interact with the patient simulator on a one-to-one basis rather than in a group.	Future studies should be conducted using a larger sample, for better generalizability of the findings. Additionally, further research is needed to examine differences in student outcomes

		Time constraints have prohibited us from evaluating them individually; however, we realize that this could be beneficial to the student as an individual.	based on size, type, and location of baccalaureate programs. Given the ongoing debate related to educational entry into practice requirements, examination of differences of the relationships between these variables should also be explored among both associate and baccalaureate students.
Funding Source	None noted	Title III Project Grant	None noted
Comments	Addressing student anxiety	Simulation increases critical thinking on all levels.	Importance of designing learning opportunities to student individual needs
Article Title and Journal	**The role of personality and self-efficacy in the selection and retention of successful nursing students: a longitudinal study Journal of Advanced Nursing,**	**Patient safety: numerical skills and drug calculation abilities of nursing students and Registered Nurses Journal of Advanced Nursing**	**Nursing Students' Performance: Administering Injections in Laboratory and Clinical Area; Journal of Nursing Education**
Author/Year	McLaughlin K; Moutray M; Muldoon OT (2008). The role of personality and self-efficacy in the selection and retention of successful nursing students: a longitudinal study. *Journal of Advanced Nursing, 61* (2), 211-21	Miriam, M., Jones, R., & Lea, S. (2010) Patient safety: numerical skills and drug calculation abilities of nursing students and Registered Nurses. *Journal of Advanced Nursing***,** *66* (4), 891-899.	Megel, M. E., Wilken, M. K., & Volcek, M. K., (1987). Nursing students' performance: Administering injections in laboratory and clinical area. *The Journal of Nursing Education 26*(7), 288-293.
Database and Keywords	CINAHL with Full Text Academic Achievement; Personality; Self-Efficacy; Student Retention; Student	Academic Search Premier Pharmaceutical arithmetic; medication errors; prevention; mathematical ability; evaluation;	CINAHL with Full Text Drug Administration; Anxiety; Students, Nursing; Teaching Methods, Clinical; Injections;

	Selection; Students, Nursing; Adolescent: 13-18 years; Adult: 19-44 years; Female	numeracy; nursing students; nursing -- Practice; clinical competence; training of; safety measures	Education, Nursing, Associate; Adolescent: 13-18 years; Adult: 19-44 years; Male; Female
Research Design	Quasi experiment, longitudinal study	Cross-sectional study	Quasi-experimental study
Level of Evidence	III	IV	III
Study Aim/Purpose	This paper is a report of a study to examine the role of personality and self-efficacy in predicting academic performance and attrition in nursing students.	This paper is a report of a correlational study of the relations of age, status, experience and drug calculation ability to numerical ability of nursing students and Registered Nurses	This study examined the skill of parenteral medication administration, comparing, laboratory proficiency to clinical proficiency over time
Population Studied/Sample Size/Criteria/Power	A convenience sample of 384 nursing students from a UK university, 350 female and 34 male, completed the initial questionnaire. All participants were in the first 4 weeks of study on a university-based Common Foundation Programme for a Preregistration Higher Education Diploma in Nursing Studies (equivalent to the first 2 year of a bachelor's degree). In addition to other qualifications, all had a minimum educational attainment of at least five General Certificate of Secondary Education subjects at grades A–C (or equivalent) including English language and a mathematical/scientific subject. Their mean age was 20.7	The participants consisted of a convenience sample of all September cohort students (n = 137) and all February cohort students (n = 92) attending a second year diploma in nursing course at one UK university and a convenience sample of 44 Registered Nurses, predominantly working in primary care, attending a post-registration non-medical prescribing programme at the same university. The diploma of nursing undergraduate programme is a 3 year full-time course with intakes twice a year. On successful completion of the programme students are eligible to join the Nursing and Midwifery Council Professional register, which enables them to practise as a Registered Nurse. The total length of	The study population consisted of all first year associate degree nursing students at the University of Nebraska College of Nursing. The sample consisted of 35 students.

	years (SD = 3.95). Three hundred and fifty students were successfully followed-up and final marks and attrition rates obtained, representing 91% of the original study.	the non-medical prescribing module is 39 days over a 6-month period, and involves 27 taught days in the university and 12 days of learning in practice. Successful completion of this module enables Nurses to obtain the UK Nursing and Midwifery Council recordable qualification of Nurse Independent and Supplementary Prescriber.	
Methods/Study Appraisal/Synthesis Methods	A longitudinal design was adopted. A questionnaire, which included measures of personality and occupational and academic self-efficacy, was administered to 384 students early in the first year of the study. At the end of the programme, final marks and attrition rates were obtained from university records for a total of 350 students. The data were collected from 1999 to 2002.	A cross-sectional study was carried out in 2006 in one United Kingdom university. Validated numerical and drug calculation tests were given to 229 second year nursing students and 44 Registered Nurses attending a non-medical prescribing programme.	A 25-item injection skill check list which listed critical behaviors which must be performed in either the college laboratory of clinical laboratory. The second tool used was Spielberger's State/Trait Anxiety Inventory, form Y. This instrument consists of two 20-itme self-report scales designed to measure anxiety-proneness (trait) and current level of anxiety (state).
Primary Outcome Measures and Results	Our results indicate that individuals with higher psychoticism scores were more likely to withdraw from the course. This is in line with previous research which suggested that psychoticism can impair academic performance (Aluja-Fabregat & Torrubia-Beltri 1998, Sanchez-Marin et al. 2001). Our findings also illustrate	The numeracy test was failed by 55% of students and 45% of Registered Nurses, while 92% of students and 89% of nurses failed the drug calculation test. Independent of status or experience, older participants (‡35 years) were statistically significantly more able to perform numerical calculations. There was no statistically significant difference between	Surprisingly, these students committed very few errors when performing injections and their anxiety was not particularly high. In the clinical area, faculty support may have served to reduce student anxiety, and faculty assistance may have reduces the number of errors committed. This study raised more questions about teaching

	how it can contribute to attrition, as previously suggested by Deary et al. (2003). Our results also illustrated that individuals who scored higher on extraversion were more likely to achieve lower marks.	nursing students and Registered Nurses in their overall drug calculation ability, but nurses were statistically significantly more able than students to perform basic numerical calculations and calculations for solids, oral liquids and injections. Both nursing students and Registered Nurses were statistically significantly more able to perform calculations for solids, liquid oral and injections than calculations for drug percentages, drip and infusion rates.	skills and conducting research in the area of skill learning than it answered.
Author Conclusions/Implications of Key Findings	Our findings raise important issues concerning the selection and retention of nursing students. They highlight the need to systematically track undergraduates and, indeed new graduates to help quantify and understand attrition and begin to build an evidence-base to inform policy on these issues. However, to date there has been very little systematic testing of the recruitment of potential students. Whilst the idea of selection criteria based on personality attributes has been proposed by some, this issue remains controversial. We acknowledge the multifaceted	Conclusion. To prevent deskilling, Registered Nurses should continue to practice and refresh all the different types of drug calculations as often as possible with regular (self)-testing of their ability. Time should be set aside in curricula for nursing students to learn how to perform basic numerical and drug calculations. This learning should be reinforced through regular practice and assessment.	The results of this study suggest that further study be conducted with a larger sample, a variety of educational strategies, and improved instruments. Additionally, other psychomotor skills could be studied to discover factors that influence effective and efficient skill learning and performance, and to substantiate effective teaching/learning principles and practices.

	nature of attrition and retention of nurses and nursing students and do not propose that it could be solved with the use of psychological testing alone as a means of selection. However, our results suggest that psychological profiling may have an important contribution to make. Further research is needed to build up a knowledgebase about the selection and recruitment of nursing students if we are to succeed in ensuring that those most likely to complete education programmes are recruited.		
Strengths/ Limitations	In addition, this research would certainly benefit from including some qualitative information to paint a fuller picture, such as exit interviews (Glossop 2001). Another limitation to our study is that it focuses on students from one particular programme, and it may have been more fruitful to include students from a number of programmes. Finally, these results are based on students' self-reports; the inclusion of educators' opinions or ratings, lecture behavior r student's level of motivation would have enhanced our findings.	A limitation of this study was that the Registered Nurses were a self-selected sample of Nurses attending a non-medical prescribing programme, with the majority working predominantly in a primary care (community) setting. An additional limitation of the study was that it was carried out in one UK university. Due to the local context of data collection, caution should be therefore exercised in generalizing the findings.	The sample size was a limitation

Funding Source	None noted	This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.	None noted
Comments	Personality types and level of self-efficacy predicting student performances	Student errors in drug calculations	Comparison of lab proficiency to clinical proficiency with medication administration
Article Title and Journal	**Simulate clinical experience: Nursing students' perceptions and educators' role Nurse Educator**	**Enhancing graduate nurses' health assessment knowledge and skills using low-fidelity adult human simulation**	**Clinical Reasoning: Concept Analysis; Journal of Advanced Nursing**
Author/Year	Anne M., Schoening, B., & Sittner, Todd., M. (2006). Simulate clinical experience: Nursing students' perceptions and educators' role. *Nurse Educator, 31* (6): 253-258	Shepherd, I., Kelly, C., Skene, F., & White, K. (2007). Enhancing graduate nurses' health assessment knowledge and skills using low-fidelity adult human simulation. S*imulation in Healthcare 2*(1) 16-24.	Simmons, B. (2010). Clinical reasoning: concept analysis. *Journal of Advanced Nursing.* doi: 10.1111/j.1365-2648.2010.05262.x
Database and Keywords	CINAHL with Full Text Education, Nursing, Baccalaureate; Simulations; Teaching Methods, Clinical; Adult: 19-44 years; Female; Male	OVID Simulation, low-fidelity, skills, graduate nurse	CINAHL with Full Text Decision Making, Clinical; Diagnostic Reasoning; Thinking
Research Design	Non experimental pilot evaluation study; qualitative study	RCT	Descriptive
Level of Evidence	IV	II	V
Study Aim/Purpose	To identify and refine simulation learning activities, learning	To investigate the impact of three learning interventions on graduate	This paper is a report of a concept analysis of clinical reasoning in

	objectives, and student perceptions of the experience	nurse health assessment knowledge and skills. It was hypothesized that the patient assessment skills of graduate nurses who completed a simulation learning activity would be superior to those who completed traditional education activities.	nursing
Population Studied/Sample Size/Criteria/Power	60 baccalaureate nursing students – second semester of their junior year – all but one were female; average age 22 years.	Eighty graduate nurses randomly assigned to one of the three education intervention groups	Literature for this concept analysis was retrieved from several databases including CINAHL, PubMed, PsycINFO, ERIC, and OvidMEDLINE, for the years 1980 – 2008.
Methods/Study Appraisal/Synthesis Methods	Pre simulation and post simulation self -evaluation	Graduate nurses were randomly allocated to three groups (1:self-directed learning package (SDLP) only, 2: SDLP plus two scenario-based PowerPoint workshops; and 3: SDLP plus two simulation education sessions using a manikin with low-fidelity capabilities. Following the education activities, graduates completed an individual test involving a systematic patient assessment upon a manikin. They were scored using a checklist of relevant responses	Rodger's evolutionary method of concept analysis was used because of its applicability to concepts that are still evolving
Primary Outcome Measures and Results	The Likert scale was utilized in the surveys done utilizing a 1-4 scale (4 is strongly agree). Outcome – the grand mean for meeting the simulation objectives was 3.64 and the grand mean for	Analysis of variance results suggest that the mean test score for nurses in the simulation group (mean=135.52, SD=26.63) was significantly higher (P<.001) than those in the learning package group (mean=107.42,	Multiple terms have been used synonymously to describe the thinking skills that nurses use. Research in the past 20 years has elucidated differences among these terms and identified the

	student perceptions of the simulation was 3.75. Students also wrote a reflective journal entry.	SD=29.82) and the PowerPoint group (mean=102.77, SD=31.68).	cognitive processes that precede judgment and decision-making. Our concept analysis defines on of these terms, 'clinical reasoning', as a complex process that uses cognition, metacognition, and discipline-specific specific knowledge to gather and analyse patient information, evaluate its significance, and weigh alternative actions
Author Conclusions/ Implications of Key Findings	The data presented here imply that simulation may help to better prepare new graduates for the real world of bedside nursing	Simulation appears to be an effective educational tool for teaching patient assessment knowledge and skills to graduate nurses. Incorporation of such technology into graduate nurse education may decrease the time required to become clinically proficient, resulting in more confident and work-ready practitioners.	This concept analysis provides a middle-range descriptive theory of clinical reasoning in nursing that helps clarify meaning and gives direction for future research. Appropriate instruments to operationalize the concept that needs to be developed. Research is needed to identify additional variables that have an impact on clinical reasoning and what are the consequences of clinical reasoning in specific situations.
Strengths/ Limitations	Simulated clinical experiences may not always be possible for every school of nursing. Nurse researchers must continue to investigate the potential benefits of this method of instruction. Future research should focus on measuring knowledge outcomes	Due to time and logistics, it was not possible to assess the practical skills of the graduate nurses before the research commenced. It was not logistically possible to have the same two staff perform all individual test scenarios. There were some instances where the nurse	The inclusion of additional disciplines, research prior to 1980, and languages other than English would have broadened the analysis. This concept analysis is a contribution toward the development of a middle-range descriptive theory of

	in addition to the themes presented here, such as increased self-efficacy, skill mastery, and transferability with reliable and valid tools.	educator may not have been "blind" to the research intervention group of individual graduate nurses. The assessment scenarios were not recorded as this may have increased the anxiety levels of the graduates and impeded performance, although recordings may have been of assistance in establishing inter-rater reliability which was not examined in this study. There were certain limitations to the manikin itself in that it could not match all the characteristics of a real patient.	clinical reasoning in nursing. However, it has limitations in separating the term from similar ones identified in the literature search.
Funding Source	None noted	None noted	The research received no specific from any funding agency in the public, commercial, or not-for-profit sectors.
Comments	Effectiveness of simulation	Simulation vs traditional methods to teach skill - simulation more effective and quicker	Definition of clinical reasoning
Article Title and Journal	**Clinical decision-making skills on the developmental journey from student to Registered Nurse: a longitudinal inquiry Journal of Advanced Nursing**	**Perspectives on competency-based medical education from the learning sciences Medical Teacher**	**Causes of intravenous medication errors: an ethnographic study Quality and Safety in Heath Care**
Author/Year	Standing, M. (2007) Clinical decision-making skills on the developmental journey from student to Registered Nurse: a longitudinal inquiry. *Journal of*	Swing, S. R. (2010). Perspectives on competency-based medical education from the learning sciences. *Medical*	Taxis, K. & Barber, N. (2003). Causes of intravenous medication error: an ethnographic study. *Quality and Safety in Health Care (12)*5. 343-347.

	Advanced Nursing, 60 (3), 257-69.	*Teacher (32)*8. 663-668.	
Database and Keywords	CINAHL with Full Text Decision Making, Clinical; Novice Nurses; Registered Nurses; Skill Acquisition; Students, Nursing; Adult: 19-44 years; Female; Male	Academic Search Premier Competency based education, medical education, reductionism, teaching, performance, ability	CINAHL with Full Text Infusions, Intravenous; Medication Errors
Research Design	Longitudinal hermeneutic phenomenological study	Descriptive	Ethnographic study
Level of Evidence	IV	VII	VI
Study Aim/Purpose	This paper is a report of a study to explore, from the perspective of nursing students, how they acquire clinical decision-making skills and how well-prepared they feel in this respect regarding their responsibilities as Registered Nurses.	This paper explores Competency-Based Medical Education (CBME) from the perspective of the learning sciences. It specifically focuses on cognitive instructional, and motivational processed that play a role in learning and integrating competency components into the complex capabilities exhibited by physicians. Overall, the paper aims to contribute to the theoretical and empirical basis for CBME.	To investigate causes of error in IV drug preparation and administration using a framework of human error theory
Population Studied/Sample Size/Criteria/Power	Volunteer sample of 20 new nursing students (Figure 1) who were broadly representative of the cohort (n = 134) and willing to explore their perceptions of clinical decision-making. Each cohort was subdivided into teaching groups of <30 students and, although not a randomized process, this invariably produced	Physicians in training	Ten wards (including intensive care, paediatrics, surgery, cardiology, and nephrology) were studied in two hospitals (a university teaching hospital and a non-teaching hospital) in the UK. Both hospitals operated a typical ward pharmacy service in which doctors wrote prescriptions on formatted inpatient drug charts

	reasonably matched groups. The new cohort list was used as a sampling frame, one of the groups was approached (26 students) and 20 agreed to participate. As in the whole cohort, sample ethnicity was predominantly white United Kingdom (UK) and white Irish. By Interview 2, three students had failed the Common Foundation Programme (first 18 months), two transferred to other universities, one left the pogramme for personal reasons, and two chose to withdraw. The remaining respondents continued to provide rich data and so attrition was less of a problem than would have been the case in a quantitative study.		and nurses used the charts to determine the doses to be given and to record the administration of drugs.
Methods/Study Appraisal/Synthesis Methods	A volunteer sample of 20 respondents, broadly representative of the student cohort regarding qualifications, age, gender, and nursing specialty, was recruited. A longitudinal hermeneutic phenomenological study was carried out from 2000 to 2004, using interviews, reflective journals, care studies, critical incident analyses and document analys	Report of expert committee	A trained and experienced observer accompanied nurses during IV drug rounds on 10 wards in the two hospitals. Information came from observation and talking informally to staff. Human error theory was used to analyse the causes of IV error.

Primary Outcome Measures and Results	Ten conceptions of nursing and 10 perceptions of clinical decision-making were identified and a growing pattern of inter-relationships between them became apparent. A 'matrix model' was developed by cross-referencing the two thematic categories within the timeline of respondents' developmental journey through significant milestones and changing contexts. As Registered Nurses they found having to 'think on your feet' without the 'comfort blanket' of student status both a stressful and formative learning experience.	Exposure to exemplars and models that illustrate sequencing of skill components, repeated performance, feedback, performance in diverse and meaningful contexts, and reflection are among the instructional and learning strategies thought to facilitate learning and application of basic and integrated sets of skills.	265 IV drug error were identified during observation of 483 drug preparations and 447 administrations. The most common type of error was the deliverate violation of guidelines when injection bolus doses faster than the recommended speed of 3-5 minutes. Causes included a lack of perceived risk, poor role models, and available technology. Mistakes occurred when drug preparation or administration involved uncommon procedures such as the preparation of very small volumes or the use of unusual drug vial presentations. Causes included a lack of knowledge of preparation or administration procedures and complex design of equipment. Underling problems were the cultural context allowing unsafe drug use, the failure to teach practical aspects of drug handling, and design failures.
Author Conclusions/ Implications of Key Findings	Further collaboration between education and health service partners is recommended to integrate clinical decision-making throughout the nursing curriculum, enhance the development of such vital skills,	Activities that require the organized application of multiple skills, actions, or competencies occur through the activation of scripts that store typical action sequences or executive processes that utilize hierarchical goal structures to	Training needs and design issues should be addressed to reduce the rate of IV drug preparation and administration error. This needs a coordinated approach from practitioners, regulators, and the pharmaceutical industry.

	and facilitate the transition from student to Registered Nurse.	dynamically select and organize skills in response to environmental demands.	
Strengths/ Limitations	The limitations of the study include the high attrition rate, reliance on retrospective interviews, geographical location, single researcher constraints and time taken to collect data. The use of self-reports rather than direct observation of nurses' clinical practice when researching clinical decision making can be criticized for its evidential value (Thompson et al. 2004). Observations may have enhanced the study, but the main emphasis was on exploring respondents' perceptions. of clinical decision-making amid 'continuously changing social reality' (Van der Zalm & Bergum 2000, p. 5). Problems of recall were lessened as respondents recorded learning experiences in reflective journals and critical incident analyses (Roberts 2002).	This paper was limited in scope by necessity, and many important processes and constructs could not be discussed. In particular, future efforts should more deeply examine the implications for CBME of theory and evidence related to situated and distributed cognition (Robbins & Aydede, 2009) and the related concepts of learning in the community (Wenger, 1998), professional identity development (Kega, 1982), and transformative learning (Mezirow et al, 2000).	We chose two contrasting hospitals and a careful cross section of wards; it is recognized that the generalizability of these findings has yet to be established, but the authors have worked in several hospitals and think the findings not uncommon. There is often concern that observation changes practice but there is little evidence of this in practice. On the other hand, while conversations with staff were part of the study methodology, we did not interview them in depth and some personal factors, such as those that have been shown to contribute to prescribing errors, may have been missed.
Funding Source	Funded by Canterbury Christ Church University, UK	None noted	K Taxis received a grant from the School of Pharmacy, University of London
Comments	Clinical decision making integration is important	Competency-based medical education to educate sequencing;	IV errors - causes during drug preparation and administration

	throughout the nursing curriculum	performance in diverse and meaningful contexts	
Article Title and Journal	**Taking the patient to the classroom: applying theoretical frameworks to simulation in nursing education International Journal of Nursing Education Scholarship**	**Characteristics of medication errors made by students during the administration phase: a descriptive study Journal of Professional Nursing**	**An investigation to find strategies to improve student nurses' math skills British Journal of Nursing**
Author/Year	Waldner, M. & Olson, J. (2007). Taking the patient to the classroom: applying theoretical frameworks to simulation in nursing education. *International Journal of Nursing Education Scholarship (4)*1.	Wolf, R. W., Hicks, R. & Serembus, J. R., (2006). Characteristics of medication error made by students during the administration phase: A descriptive study. *Journal of Professional Nursing online publication.* doi:10.1016/j.profnurs.2005.12.008	Wright, K. (2004) An investigation to find strategies to improve student nurses' math skills. *British Journal of Nursing (13)*21, 1280-1284.
Database and Keywords	CINAHL with Full Text Simulation, skill acquisition, clinical education, Benner, Kolb, teaching methods	CINAHL with Full Text Medication Errors; Students, Nursing	CINAHL with Full Text Clinical Competence; Dosage Calculation; Drug Therapy; Education, Nursing, Baccalaureate; Student Attitudes; Students, Nursing
Research Design	Descriptive	Descriptive, retrospective, secondary analysis study	Quasi-experimental
Level of Evidence	VII	V	III
Study Aim/Purpose	To discuss the development of those physical assessment and intervention skills as alternative strategies to help nursing students	To examine the characteristics of medication errors made by nursing student during the administration phase of the medication use process	To investigate whether strategies implemented within a second-year preregistration course were perceived by students to be helpful in improving their

	achieve practice competencies which are imperative.		mathematical skills for drug calculations.
Population Studied/Sample Size/Criteria/Power	Nursing Students	Reports voluntarily submitted to the USP MEDMARX database of medication errors.	71 second-year preregistration students
Methods/Study Appraisal/Synthesis Methods	Teaching Strategies	This descriptive and retrospective design study aimed to identify characteristics of medication errors made by nursing students during the administration phase and as reported in the USP MEDMARX program. In this secondary analysis study, characteristics were elicited through the pick fields of the MEDMARX Medication Error Information Report as selected by employees of facilities subscribing to the MEDMARX program. The intent was to gain more knowledge about student-made medication errors.	A study was carried out to investigate whether strategies implemented within a second-year preregistration course were perceived by students to be helpful in improving their math skills. The study had several stages: A semistruct tired questionnaire was given to 71 students at the start of the course, which asked for information on how they felt about mathematics and included a math test. Students were given the option of putting their names on the questionnaire to receive written feedback about their strengths and weaknesses or completing it anonymously. Strategies were planned after the results of the math test Students were given a semi-structured questionnaire at the end of the course asking for their perceptions about their math ability and what strategies had helped with their math skills. The results were analysed using

			descriptive statistics (these describe the data rather than testing their significance) and by coding and categorizing the students' comments into themes.
Primary Outcome Measures and Results	Using Benner's and Kolb's models, as described in this paper, could be seen as the start of an attempt to theoretically ground the development and use of simulations in nursing education. These authors contend that it is unlikely that nursing students will ever be able to practice all their skills on real patients again.	During the 5 year period, 1,305 student-made medication errors originating in the administering node were reported to the MEDMARX. Most were those of omission, followed by those of administering the wrong amount of medication.	The results demonstrated that students felt their mathematics and confidence improved as a result of these strategies. The students' evaluation of the learning strategy that they found most helpful in learning drug calculations gave a mixed result, indicating that students have differing learning styles and needs. The study also indicates that student nurses were able to integrate the mathematical skills into their nursing practice by having different strategies that allowed them to develop conceptual, mathematical and practical skills concurrently.
Author Conclusions/ Implications of Key Findings	Although the three categories of simulations in nursing education are generally well liked by faculty and students, the evidence of their effectiveness is somewhat inconclusive. Despite this lack of evidence, nurse educators continue to view simulation education as the only alternative to clinical experience.	Nursing faculty might reconsider the medication administration experiences of students and medication safety in light of these finding. Concerns about wrong time errors of students should prompt nursing educators to call students' attention to this problem during courses when medications are administered. Faculty and nursing	This study demonstrates that using a variety' of strategies to address the math skills of student nurses is effective in improving their confidence and perceived math skills. The study highlights the importance of incorporating a variety of learning methods concurrently to allow students to integrate math knowledge into

		staff may wish to reexamine the processes and circumstances associated with medications administered by nursing students.	their nursing practice. Developing the drug calculation skills of student nurses appears to be more complex than just focusing on one area of weakness, such as math skills, and addressing it. The way that student nurses develop drug calculation skills is multifaceted, requiring students to be able to: conceptualize and make sense of clinical information; use math skills and knowledge to perform a drug calculation; conceptualize the answer into a drug dosage; and refer to drug knowledge and clinical experience to assess appropriateness of the calculation answer. Thus, strategies to develop drug calculation skills need to be comprehensive in order to address these developmental areas and allow the integration and application of clinical and theoretical knowledge to drug calculations. Multifaceted strategies also allow the different learning styles and needs of students to be addressed. Further research is required in this area to ascertain the link between mixed strategies and student nurses" math abilities as well as

			the role that confidence plays in math abilities.
Strengths/ Limitations		The data collected within MEDMARX were voluntarily reported by subscribing hospitals and their related health systems and may not be representative of administration-phase medication errors involving students. However, the benefit of the reporting program is that it draws upon the experience of multiple facilities	The study only investigates students' perceptions and a post-course math test was not carried out to ascertain whether the students' perceptions correspond with their math test performance. The nursing programme is often divided into lectures, both theoretical and practical. Some students may have found a practical session with 'drug calculation theory" unfamiliar and therefore a difficult environment to learn from.
Funding Source	None noted	None noted	None noted
Comments	Simulation to practice skills and assessments that students may not be exposed to in the clinical setting.	Examines the characteristics of medication errors by nursing students: omission and wrong amounts.	Improving math skill increases confidence and ability to perform in medication calculations.

Utilized the Seven-Tiered Levels of Evidence from Houser, J., & Oman, K. (2011). *Evidence-based practice: An implementation guide for healthcare organization.* Sudbury, MA: Jones & Bartlett.

Appendix C

SWOT Analysis

SWOT Analysis	
Strengths	**Weaknesses**
Creativity in development	Author's lack of experience in performing a study
Design allows student to direct learning	Progressive simulations will be designed from scratch initially and will not have been tested
Author is motivated and passionate to facilitate student success	
Author has earned a Master of Science degree with over 20 years of direct patient care experience and 8 years of educational experience; also has a Certification in Health Care Education	
Faculty is seeking curriculum change to assist the student in success	
WCJC ADN program director fully supports this project	
Project is based on evidence-based practice and literature research	
Opportunities	**Threats**
Growing need for effective innovative methodology of teaching	Declining economy resulting in decreased educational funding
Decreasing availability of clinical sites for student nurses	Declining economy resulting in decreased personal funds to spend on education
Increasing need for simulation in the campus lab to meet clinical experience requirements	Faculty hesitant to accept change
Trends toward individual learning experiences in the simulation environment	

Appendix D

Agency Letter of Support

Wharton County Junior College
911 Boling Hwy
Wharton, TX 77488

Date: July 29, 2011

To Whom It May Concern,

It is the intent of Wharton County Junior College (WCJC) Department of Nursing to support Rickie Jo Bonner MS RN in completion of her proposed outcomes research, From Competency to Capability. WCJC will make the simulation lab and all equipment available to her. Ms. Bonner will also have our permission to have access to nursing students at the college to complete the outcomes study. In addition, she will receive faculty support in her endeavors with assistance as needed.

Deborah Yancey MSN RN

WCJC ADN Program Director

Appendix E

Cost Analysis

Item	**Quantity**	**Price each**	**Total**
IV arms	3	$ 328.93	$ 986.79
Concentrated blood	1	6.00	6.00
Laerdal Nursing Anne manikins	3	4,452.00	13,356.00
Vital Sim Modules	3	2,450.00	7,350.00
Laerdal Advanced Video System (AVS) + installation	3 cubicles set up with 3 cameras in each plus installation		26,695.00
Lap top computers	3	350.00	1,050.00
Desktop computers and monitors	3	700.00	2,100.00
Med Station Supplies 70/30 insulin Regular insulin Water (will be labeled by Instructors to be the needed meds)	 2 vials 2 vials 5 vials	 1.81 1.81 1.81	 3.62 3.62 9.05
Protective bed pads	10	.25	25.00
Alcohol swabs	1 box	2.75	2.75
Exam gloves – 2 boxes each small, medium, large	6 boxes: Sizes small, medium, and large (1box each)	7.19	43.14
Nasal Cannula	3	4.48	13.44
Salem sump tube	1	3.69	3.69
Suction machine	1	718.00	718.00
IVF 1000ml	3	3.48	10.44
O2 saturation monitor	1	106.99	106.99
Foley catheter with bedside drainage bag	1	12.69	12.69
Knee high TED hose	2 pair	8.68	17.36
Isolation gown	25	1.88	47.00
Sharps containers	3	9.38	28.14
Instructor salary	60 hours	$40/hr	2,400.00
Office Supplies			15.00
		Total	**$55,003.72**

Student Kits			
Item	**Quantity**	**Unit Price**	**Total**
IV cathelons	2	1.04	$ 2.08
3ml syringes with 22g 1” needles	2	.25	.50
20g 1” needles	2	.75	1.50
IV start kits	2	2.31	4.62
Pigtail ext tubing	2	6.86	13.36
1ml insulin syringe	2	.15	.30
1 ½ ml insulin syringe	2	.15	.30
1 TB syringe	2	.15	.30
2 100ml NS IVPB bags	4	3.59	14.36
2 primary IV tubing	2	6.88	13.76
2 secondary IV tubing	2	5.56	11.12
2 Saline flushes 10ml	2	1.06	2.12
1” Dermicel Tape	1 roll	1.95	1.95
	Total	**$ 66.27 X 22 =**	**$ 1457.94**

Total Cost of Study - $56,461.66

Appendix F

Timeline

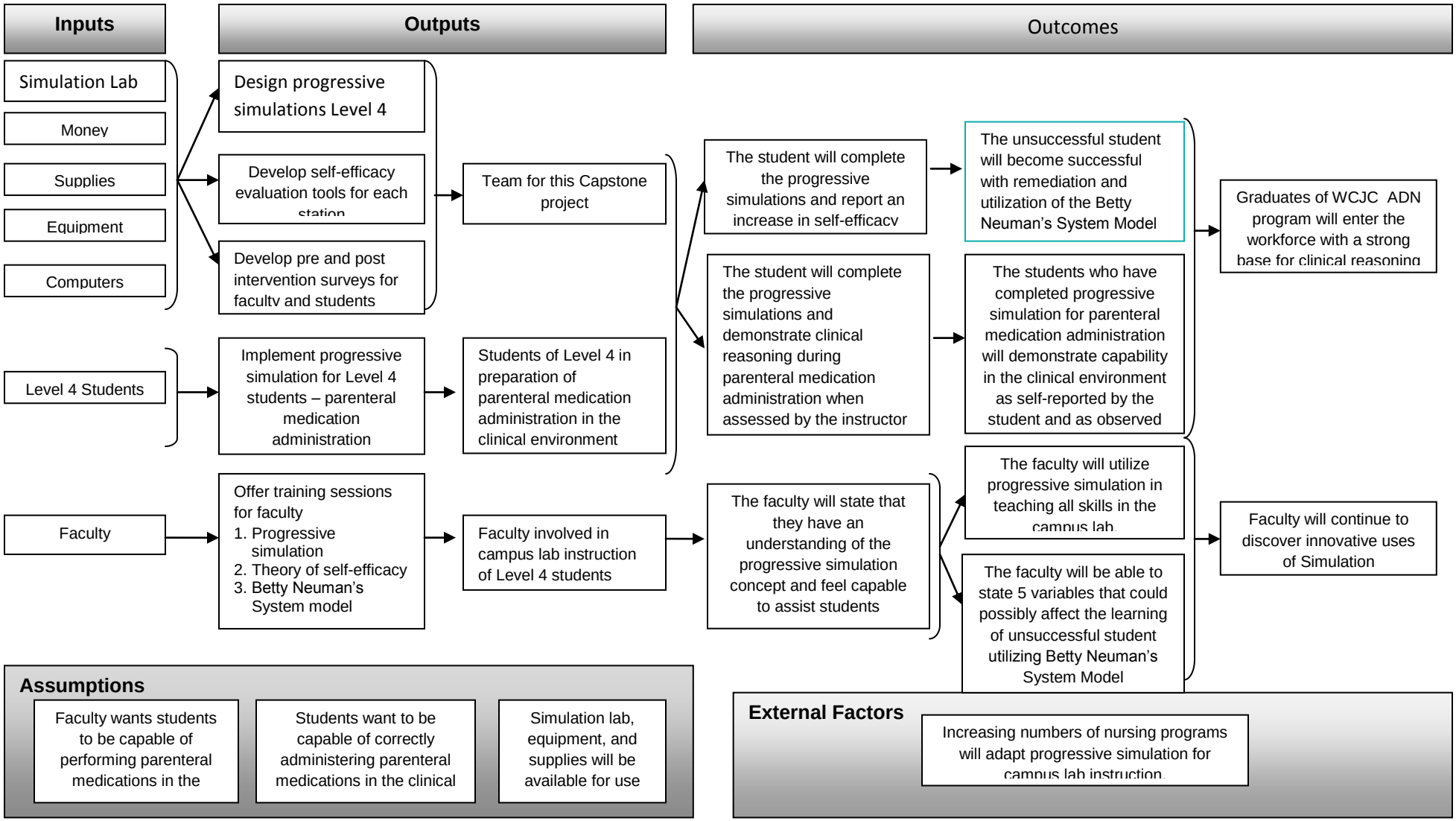
	2010 Aug	**Sept**	**Oct**	**Nov**	**Dec**	**2011 Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**2012 Jan**	**Feb**	**Mar**	**Apr**	**May**
NR701 Praxis Model																						
Applied Statistics																						
Informatics																						
Population Assessment																						
Systematic Review of Literature																						
Team selection																						
Develop mission statement																						
Develop project management tools																						
Begin to develop evaluation plan																						
Develop logic model																						

TASK	2010 Aug	Sept	Oct	Nov	Dec	2011 Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	2012 Jan	Feb	Mar	Apr	May
IRB Process																						
Define Scope of project																						
Develop process/outcome objectives																						
Develop surveys																						
Finalize goals																						
Perform surveys once IRB process completed																						
Develop remediation process																						
Implement remediation process for Level 4																						
Cost /benefit analysis																						

TASK	2010 Aug	Sept	Oct	Nov	Dec	2011 Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	2012 Jan	Feb	Mar	Apr	May
Begin to develop process of giving meaning to data																						
Post-intervention surveys with Level 4 students who remediated in the summer																						
Perform post intervention surveys with faculty																						
Written dissemination																						
Oral dissemination																						
Data Analysis																						
Submission for publications																						

Appendix G

From Competency to Capability Logic Model



Appendix H

Faculty Survey

This survey is being conducted as a basis for my Capstone Project, "From Competency to Capability".
The purpose of this survey is to assist in identifying a problem that we can improve on pertaining to teaching skills and clinical reasoning to facilitate our students in transitioning what is learned in the lab to application in the clinical environment. Your participation is greatly appreciated! Rickie Jo Bonner

Item	1 Very Dissatisfied	2 Dissatisfied	3 No Opinion/ Neutral	4 Satisfied	5 Very Satisfied	6 N/A
1. Overall, how would you rate our **current** preparation of students to **being capable** to perform a skill in the **unstable and unpredictable environment of the clinical setting?**						
2. Rate the adequacy of our current practices of utilizing a **stagnant manikin (ex. A pelvic model) or appliance** in preparing students to insert a **foley catheter (FC) in the clinical setting**						
3. Rate the adequacy of our current practices of utilizing a **stagnant manikin or appliance** in preparing students in preparing students to **insert an NGT in the clinical setting**						

4. Rate the adequacy of our current practices of **using other students** in preparing student to **administer PO in medications in the clinical setting.**						
5. Rate the adequacy of our current practices of utilizing a **stagnant manikin or appliance** in preparing students **to administer parenteral (IV, IVPB, IM, SubQ) medications in the clinical setting.**						
6. If given only one area to approach at this time, which of the following would you rate **most important**?	□ FC insertion □ PO med administration □ NGT insertion □ Parenteral med administration					

Parenteral Medication Administration Campus Lab
Current Practice Evaluation

Item	1 Very Dissatisfied	2 Dissatisfied	3 No Opinion/ Neutral	4 Satisfied	5 Very Satisfied	6 N/A
1. Please rate our current campus lab activities related to **parenteral drug administration** concerning preparing the student in **being competent** at the performing the skills required in the **stable and predictable campus lab environment.**						
2. Please rate our **campus lab activities** related to parenteral drug administration concerning preparing the student in **being capable** to perform the skills learned in campus lab while **in the unstable and unpredictable clinical environment**.						
3. **All:** Overall, what is your opinion of how well we currently incorporate **clinical reason** during campus lab when teaching parenteral drug administration?						

Parenteral Medication Administration
Overall Student Performance Evaluation

Item	1 Hands on assistance	2 Maximum verbal guidance	3 Moderate verbal guidance	4 Minimal verbal guidance	5 Independent	6 N/A
1. Given the task of administering the following scheduled medications **at 9AM** to a 97 year old patient who is experiencing pain rated 7/10 in her fractured right hip, rate how you feel that students in your clinical group would perform? Vancomycin 1GM **IVPB** Rocephin 1GM **IVPB** Sliding Scale Regular Insulin **Sub Q** 4 units (BS of 124) Toradol 15mg **IM** Lasix 20mg **IVP**						
2. How would you rate your students' ability to review /reconcile the **Medication Administration Record (MAR)** then formulate and complete interventions necessary to safely and correctly administer medications when a **lab assessment** is indicated?						
3. How would you rate your students' ability to review /reconcile the **MAR** then formulate						

and complete interventions necessary to safely and correctly administer medications when a **vital sign assessment** is indicated?						
4. How would you rate your students' ability to review /reconcile the **MAR** then formulate and complete interventions necessary to safely and correctly administer medications when an **allergy** to an ordered medication is present?						
5. How would you rate your students' ability to review the **MAR** then formulate and complete interventions necessary to safely and correctly administer medications when a **dosage calculation** is necessary?						
6. How would you rate your students' ability to **correctly establish the flow rate for an IVPB infusion**?						
7. How would you rate your student's ability to **troubleshoot a problem with an IV site/IV pump**?						
8. How would you rate your students' ability to correctly **document** meds administered on the **MAR**?						

Appendix I

Self-Efficacy Rating Survey

The form below lists different activities. In the column **Confidence,** rate how confident you **are that yo**u can do them **as of now.** Rate your degree of confidence by recording a number from 0 to 100 using the scale given below: **(Fill in the appropriate number)**

Confidence Rating Scale

0	10	20	30	40	50	60	70	80	90	100
I cannot do at all				**I am moderately certain I can do**					**I am highly certain I can do**	

Basics of Medication Administration	
Item	**Confidence (0-100)**
Hand washing	
Identify self to patient	
Identify patient using two indicators	
Explanation of procedures to patient	
Patient teaching for each med	
Preparation of necessary supplies/equipment	
Documentation on MAR and in nurses notes as indicated	
Total Score	
MAR Review/Reconciliation	
Item	**Confidence (0-100)**
Reconciling MAR to physician order	
Correction of any discrepancies	
Assessing allergies to any meds	
Math calculation	
Assessing appropriateness of dosage	
Assessing appropriateness of route	
Assessing appropriateness of scheduling of med (time frame)	
Knowledge of why med is ordered	
Assessing appropriate lab values	
Knowledge of what pt assessment is indicated and time frame	
Total Score	

Confidence Rating Scale

0	10	20	30	40	50	60	70	80	90	100

I c**annot do at all** **I am moderately certain I can do** **I am highly certain I can do**

Fill in the appropriate number

Subcutaneous injection:	
Item	**Confidence (0-100)**
Choice of needle size	
Drawing up correct dose	
Eliminate air bubbles	
Selection of site/ID of anatomical landmarks	
Technique of injection	
Utilization of universal precautions	
Total Score	
IM Injection:	
Item	**Confidence (0-100)**
Choice of needle size	
Drawing up correct dose	
Eliminate air bubbles	
Selection of site/ID of anatomical landmarks	
Technique of injection	
Utilization of universal precautions	
Total Score	
Inserting Saline lock	
Item	**Confidence (0-100)**
Selection of catheter size	
Selection of site	
Insertion	
Sterile dressing	
Securing tubing	
Flushing with Normal Saline	
Labeling dressing	
Total Score	

Confidence Rating Scale

0	10	20	30	40	50	60	70	80	90	100
I cannot **do at all**				**I am moderately certain I can do**					**I am highly certain I can do**	

Fill in the appropriate number

IVPB Med Administration	
Item	**Confidence (0-100)**
Spiking bag with correct tubing	
Correctly tags new tubing for tubing change time frame	
Total Score	
If utilizing a SL:	
Correctly prime tubing	
Flush line/Assess site during flush	
Correctly attach tubing to port	
Administer med over correct time frame	
Program IV pump to correct rate for IVPB	
When completion complete -Flush line /Assess site during flush	
Clamp tubing if pigtail utilized	
Total Score	
If utilizing an ongoing infusion site:	
Correctly prime tubing	
Hang piggyback at correct level in relation to main IV bag	
Choose correct port to insert IVPB tubing into	
Program IV pump to correct rate for IVPB	
Initiate infusion and confirm correctly infusing	
Assess site during infusion	
Total Score	

Overall Self-Appraisal Total:	

Appendix J

BARS

Appendix C ***Behaviorally Anchored Rating Scale***
MAR Review/Reconciliation

Name: _____ Date: _____
KEY:

Rating	0	1	2	3
Descriptor	**Not Performed Correctly or **Critical Indicator Missed**	**Performed Correctly with Moderate Assistance**	**Performed Correctly with Minimal Assistance**	**Performed Correctly Independently**

(Circle the appropriate score utilizing the indicators as guides)

Reconciliation of MAR with physician order:

Rating	0	1	2	3

- Reconciled each drug listed on MAR in a systematic way

Instructor Comment:
_____
_____
_____

Correction of any discrepancies (If none, mark N/A):

Rating	0	1	2	3	N/A

- Demonstrate knowledge of action to take if discrepancy found

Instructor Comment:
_____
_____
_____

Assess allergies:

Rating	0	1	2	3

- Assesses for medication allergies
- If allergy noted, states correct action to take

Instructor Comment:

_____
_____
_____

Math calculation (If none indicated, mark N/A):

Rating	0	1	2	3	N/A

- Performs math calculation to check dosing correctly

Instructor Comment:

_____
_____
_____

*****Assess appropriateness of dosage:***

Rating	0	1	2	3

- Assesses for appropriateness of dosage
- If incorrect dosage noted, states correct action to take

Instructor Comment:

_____
_____
_____

*****Assess appropriateness of route:***

Rating	0	1	2	3

- Assesses for appropriateness of route
- If route inappropriate, states correct action to take

Instructor Comment:

_____
_____
_____

*****Assess appropriateness of scheduling of med (time frame):***

Rating	0	1	2	3

- Assesses appropriateness of scheduling of med (time frame)
- If time frame inappropriate, states correct action to take

Instructor Comment:

_____
_____
_____

Purpose of medication order:

Rating	0	1	2	3

- State why patient is receiving the medication

Instructor Comment:

_____
_____
_____

Assesses appropriate lab values for each medication (If no lab indicated, mark N/A):

Rating	0	1	2	3	N/A

- Assesses lab values for each medication
- If time lab result is out of range, states correct response
  a. Proceed with administration
  b. Hold medication and notify MD

Instructor Comment:

_____
_____
_____

Knowledge of patient assessment indicated for medications (If no assessment indicated, mark N/A:

Rating	0	1	2	3	N/A

- States/demonstrates correct patient assessment prior to medication administration if indicated
- States/demonstrates correct patient assessment following medication administration and correct time frame for assessment
- If assessment findings a concern, states correct action to take

Instructor Comment:

_____
_____
_____

Total Score: _____

Instructor: _____ Date: _____

Student: _____ Date: _____

Behaviorally Anchored Rating Scale
Medication Administration Basic

KEY:

Rating	0	1	2	3
Descriptor	**Not Performed Correctly or **Critical Indicator Missed**	**Performed Correctly with Moderate Assistance**	**Performed Correctly with Minimal Assistance**	**Performed Correctly Independently**

(Circle the appropriate score utilizing the indicators as guides)

Introduction:

Rating	0	1	2	3

- Introduced self, using name and status

Instructor Comment:

_____
_____
_____

*****Identifying patient:***

Rating	0	1	2	3

- Identified patient using TWO acceptable indicators and appropriate method
- Compared TWO acceptable indicators to MAR or doctors order

Instructor Comment:

_____
_____
_____

Washing hands:

Rating	0	1	2	3

- Washed hands at appropriate intervals (either sani-wash or soap and water)
- Utilized correct hand washing technique

Instructor Comment:

_____
_____
_____

Explanation:

Rating	0	1	2	3

- Student explained, to patient, what was going to be done
- Explanation appropriate for student current level in program
- Explanation language was level appropriate for patient (did not use medical terms that patient would not understand)

Instructor Comment:

_____
_____
_____

Pre medication administration assessment: (If no assessment indicated, rate N/A)

Rating	0	1	2	3	N/A

- Appropriate assessment verbalized/demonstrated
- Appropriate decision made based on assessment findings

Instructor Comment:

_____
_____
_____

Post medication administration assessment: (If no assessment indicated, rate N/A)

Rating	0	1	2	3	N/A

- Appropriate assessment/time frame verbalized /demonstrated

Instructor Comment:

_____
_____
_____

Patient teaching

Rating	0	1	2	3

- Demonstrated knowledge of purpose of medication by giving explanation to patient
- Explanation language was level appropriate for patient (did not use medical terms that patient would not understand)

Instructor Comment:

_____
_____
_____

*****Documentation***

Rating	0	1	2	3

- Correctly documents assessment findings on MAR or in Nurse Notes as indicated

Instructor Comment:

_____
_____
_____

Total Score: _____

Instructor: _____ Date: _____

Student: _____ Date: _____

Behaviorally Anchored Rating Scale
Subcutaneous Injections

KEY

Rating	0	1	2	3
Descriptor	**Not Performed Correctly or **Critical Indicator Missed**	**Performed Correctly with Moderate Assistance**	**Performed Correctly with Minimal Assistance**	**Performed Correctly Independently**

(Circle the appropriate score utilizing the indicators as guides)

Choice of Needle Size

Rating	0	1	2	3

- Correct needle size for subcutaneous injection

Instructor Comment:

_____
_____
_____

Preparing correct dose

Rating	0	1	2	3

- Prepared correct dose
- Eliminated air bubbles
- Demonstrates THREE checks for correct medication and correct dose (includes one check of expiration date)

Instructor Comment:

_____
_____
_____
_____

Selection of injection site

Rating	0	1	2	3

- Selected acceptable injection site
- Demonstrated utilization of anatomical landmarks to identify site

Instructor Comment:

_____
_____
_____

Technique of injection

Rating	0	1	2	3

- Utilizes correct technique for subcutaneous injection
- Utilizes universal precautions

Instructor Comment:

_____
_____
_____

Total Score: _____

Instructor: _____ Date: _____

Student: _____ Date: _____

Behaviorally Anchored Rating Scale
Intramuscular Injections

KEY

Rating	0	1	2	3
Descriptor	**Not Performed Correctly or **Critical Indicator Missed**	**Performed Correctly with Moderate Assistance**	**Performed Correctly with Minimal Assistance**	**Performed Correctly Independently**

(Circle the appropriate score utilizing the indicators as guides)

Choice of Needle Size

Rating	0	1	2	3

- Correct needle size for intramuscular injection

Instructor Comment:

_____
_____
_____

Preparing correct dose

Rating	0	1	2	3

- Prepared correct dose
- Eliminated air bubbles
- Demonstrates THREE checks for correct medication and correct dose (Includes one check of expiration date)

Instructor Comment:

_____
_____
_____

Selection of injection site

Rating	0	1	2	3

- Selected acceptable injection site
- Demonstrated utilization of anatomical landmarks to identify site

Instructor Comment:

_____
_____
_____

Technique of injection

Rating	0	1	2	3

- Utilizes correct technique for intramuscular injection
- Utilizes universal precautions

Instructor Comment:

_____
_____
_____

Total Score: _____

Instructor: _____ Date: _____

Student: _____ Date: _____

Behaviorally Anchored Rating Scale
IVPB per Saline Lock

KEY

Rating	0	1	2	3
Descriptor	**Not Performed Correctly or **Critical Indicator Missed**	**Performed Correctly with Moderate Assistance**	**Performed Correctly with Minimal Assistance**	**Performed Correctly Independently**

(Circle the appropriate score utilizing the indicators as guides)

Preparation of IVPB

Rating	0	1	2	3

- **Demonstrates THREE checks for **correct medication and correct dose** (Includes one check of expiration date)
- Demonstrates correct preparation of IVPB
  a. Spikes bag correctly
  b. Tags tubing for tubing change time frame

Instructor Comment:

_____
_____
_____

Primes tubing

Rating	0	1	2	3

- Correctly primes tubing
- Maintains sterility of tubing tip

Instructor Comment:

_____
_____
_____

Flushes

Rating	0	1	2	3

- Correctly flushes SL with 3-5 ml of Normal Saline before and after drug administration
- Assesses IV site during procedure
- Clamps extension tubing when procedure completed (if extension present)

Instructor Comment:

_____
_____
_____

Administration of IVPB

Rating	0	1	2	3

- Administers medication over **correct time** frame
- Program IV pump correctly for this time frame
- Initiates infusion and confirms correctly infusing before leaving room
- Assesses IV site correctly

Instructor Comment:

_____
_____
_____

Total Score: _____

Instructor: _____ Date: _____

Student: _____ Date: _____

Behaviorally Anchored Rating Scale
IVBP – Continuous Infusion

KEY

Rating	0	1	2	3
Descriptor	**Not Performed Correctly or **Critical Indicator Missed**	**Performed Correctly with Moderate Assistance**	**Performed Correctly with Minimal Assistance**	**Performed Correctly Independently**

(Circle the appropriate score utilizing the indicators as guides)

Preparation of IVPB

Rating	0	1	2	3

- **Demonstrates THREE checks for **correct medication and correct dose** (Includes one check of expiration date)
- Demonstrates correct preparation of IVPB
  c. Spikes bag correctly
  d. Tags tubing for tubing change time frame

Instructor Comment:

_____
_____
_____

Administering IVPB

Rating	0	1	2	3

- Maintains sterility of tubing tip during connection
- Connects tubing at correct port of continuous infusion tubing
- Correctly primes tubing
- Hangs IVPB at appropriate level in relation to continuous infusion bag

Instructor Comment:

_____
_____
_____

Administration of IVPB

Rating	0	1	2	3

- Administers medication over **correct time** frame
- Program IV pump correctly for this time frame
- Initiates infusion and confirms correctly infusing before leaving room
- Assesses IV site correctly

Instructor Comment:

_____
_____
_____

Total Score: _____

Instructor: _____ Date: _____

Student: _____ Date: _____

Behaviorally Anchored Rating Scale
Clinical Reasoning

KEY

Rating	0	1	2	3
Descriptor	**Not Performed Correctly or **Critical Indicator Missed**	**Performed Correctly with Moderate Assistance**	**Performed Correctly with Minimal Assistance**	**Performed Correctly Independently**

(Circle the appropriate score utilizing the indicators as guides)

Prioritization

Rating	0	1	2	3

- Prioritized care appropriately (according to Maslow's Hierarchy of Needs)

Instructor Comment:

_____
_____
_____

Safety

Rating	0	1	2	3

- Identified safety issues
- Corrected safety problems

Instructor Comment:

_____
_____
_____

Organization of medication administration

Rating	0	1	2	3

- Administers medications in efficient order, ending with medications that will take the longest time frame (ex. An infusion that will take the longest time)

Instructor Comment:

_____
_____
_____

Total Score: _____

Instructor: _____ Date: _____

Student: _____ Date: _____

Appendix K

The Grading Policy

The sections that will be addressed in check-offs are:

- ✓ MAR Review/Reconciliation
- ✓ Medication Administration Basics
- ✓ Subcutaneous Injections
- ✓ Intramuscular Injections
- ✓ IVPB Medication Preparation
- ✓ IVBP per Saline Lock
- ✓ IVPB per Continuous Infusion

To pass, the student must score at least an average of 2 on each section of the check-off with a score of 2 or 3 on ALL critical indicators which are noted with **.

If a student is unsuccessful in passing any section, mandatory remediation will be scheduled with an instructor for the section(s) not passed.

Mandatory remediation will be followed with a second check-off. Again if student is unsuccessful in passing any section, mandatory remediation will be scheduled with an instructor for the section not passed.

This second mandatory remediation will be followed with a third check-off. **If the student is unsuccessful with the third attempt, the student will not pass RNSG 2463.**

Appendix L

Consent to Video

CONSENT TO VIDEO

I, _____ consent to videotaping in the Department of Associate Degree Nursing at Wharton County Junior College for educational purposes. I understand that these videos will be kept confidential and saved in a password protected file. I understand that at the end of each semester (or withdrawal) from the program, all videotapes will be erased.

_____

Signature

_____

Date

Appendix M

CITI

CITI Collaborative Institutional Training Initiative
Human Research Curriculum Completion Report
Printed on 6/12/2011
Learner: Rickie Bonner (username: maude54)
Institution: Regis University
Contact Information
Department: Faculty Email: maude54@yahoo.com
Social Behavioral Research Investigators and Key Personnel: Stage 1. Basic Course Passed on 06/12/11 (Ref # 6149294)
Required Modules
Date Completed
Introduction
06/08/11
no quiz
History and Ethical Principles - SBR
06/08/11
4/4 (100%)
The Regulations and The Social and Behavioral Sciences - SBR
06/12/11
5/5 (100%)
Assessing Risk in Social and Behavioral Sciences - SBR
06/12/11
5/5 (100%)
Informed Consent - SBR
06/12/11
5/5 (100%)
Privacy and Confidentiality - SBR
06/12/11
5/5 (100%)
Regis University
06/12/11
no quiz
For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.
Paul Braunschweiger Ph.D. Professor, University of Miami Director Office of Research Education CITI Course Coordinator

Appendix N

IRB - Regis University

IRB – REGIS UNIVERSITY

August 4, 2011

Rickie Jo Bonner
1080 Coy Rd
Weimar, TX 78962

RE: IRB #: 244-11

Dear Rickie Jo:

Your application to the Regis IRB for your project "From Competency to Capability" was approved as exempt on August 4, 2011.

The designation of "exempt," means no further IRB review of this project, as it is currently designed, is needed.

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be resubmitted to the Regis IRB for approval.

Sincerely,

Don Bridger

Director, Office of Academic Grants

cc: Dr. Louise Suit

Appendix O

Information Sheet

Regis University
From Competency to Capability
Information Sheet

You are asked to participate in a research study conducted by Rickie Jo Bonner MS RN as part of her Capstone Project required to obtain a Doctorate of Nursing Practice at Regis University. Your participation in this study is entirely voluntary. You will be asked to participate in a progressive clinical simulation for medication administration. You will then be asked to specify what you have learned and how you liked learning this way. Please read the information below and ask questions about anything you do not understand, before deciding whether or not to participate.

- **PURPOSE OF THE STUDY**

The purpose of the study is to evaluate the effectiveness of the curriculum change taking place in Fall 2011. The change involves the use of progressive simulation during campus lab. Simulation assists students in safely giving subcutaneous and intramuscular medications and starting an intravenous medication infusion in the clinical setting.

- **PROCEDURES**

If you volunteer to participate in this study, you will be asked to do the following things:

1. Complete a pre-simulation Self-Appraisal Survey and submit it.
2. Participate in the progressive simulations, made up of three stations, taking place August 8-August12, 2011.
   a. Each station progresses in challenges and focuses on:
      1. The skill of IM and Sub-Q injections and starting an IV medication infusion
      2. Medication Administration Review and Reconciliation
      3. Actual administration of medications to a patient (manikin)
   b. You have a three hour time frame to complete your progressive simulation, but if you need more time, arrangements will be made.
   c. If you complete a progressive simulation and feel the need to repeat the process, there will be two other progressive simulations that you may choose to do.
   d. Complete a post-simulation Self-Appraisal Survey and submit it.
   e. Perform the mandatory check-off of these tasks in Fall 2011 as part of RNSG 2463 This check-off grade will be counted as a grade in RNSG 2463. This check-off will be audio and visually recorded in the Wharton Campus lab. Each student has a private area in which to work, sectioned off by curtains. As a student in the Wharton County Junior College (WCJC) Associate Degree Nursing (ADN) Program, you have consented to audio video recording during the RNSG 2463 syllabus review session. (Appendix M) Please note that the check off and grading will be done the same for all students enrolled in Fall 2011 RNSG 2463, whether or not they participate in this study. Participation or no participation in the study will not influence your grade in the

course.

f. Upon passing this campus lab check-off, you will then be assessed for medication administration during clinical experience by your clinical instructor utilizing the same tool as the check off. This will only be done ONCE for each task, not every time you perform the task. This WILL NOT count as a grade for RNGG 2463. The data are for study purposes only. Your RNSG 2463 grade for clinical will be assessed using the same procedure as outlined in the syllabus, whether or not you participate in the study.
g. Complete an anonymous overall evaluation of the progressive simulation once you have completed all obligations to the study to let us know how you liked learning this way (Appendix N).

- **POTENTIAL RISKS AND DISCOMFORTS**

The risks are feeling uncomfortable with a new learning situation. Benefits are that the simulation imitates real clinical situations and may better prepare you to give medications to patients.

- **POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY**

1. Accessibility to innovative learning methods that enables the student autonomy in learning without peer pressure.
2. Simulation imitates real clinical situations.
3. Preparing graduate nurses who are better capable to safely perform medication administration with the goal of no errors.

- **PAYMENT FOR PARTICIPATION (*Optional)***

This study offers no payment for participation. Participation in the study does not influence the course grade.

- **CONFIDENTIALITY**

Any information obtained with this study that identifies you individually will remain confidential. Confidentiality will be maintained by means of records (the self-appraisal surveys and check-off grading forms) being stored in locked file cabinets. Only the investigator will have access to the self-appraisal survey results. Your clinical instructors will only have access to the grading forms. The data will be saved for three years and then shredded. All audio-visual recordings of you will be stored in a password protected computer file. These recordings will be utilized for teaching purposes and during remediation if necessary. All recordings will be erased at the end of the semester as per policy of WCJC. Your evaluation of this style of learning will be done anonymously. Data will be reported as aggregate data and no individual results will be reported.

- **PARTICIPATION AND WITHDRAWAL**

You can choose whether or not to participate in this study. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind or loss of benefits to which you are otherwise entitled. You may also refuse to answer any questions you do not want to answer. Withdrawal or nonparticipation will not affect your grade in the course in any way.

The investigator may withdraw you from this research without regard to your consent if you are dismissed from the WCJC ADN program for any reason.

- **IDENTIFICATION OF INVESTIGATORS**

If you have any questions or concerns about this research, please contact:

Principal Investigator: Rickie Jo Bonner MS RN
Office: (979) 532-6404
Cell: (979) 743-0359
Email: bonnerr@wcjc.edu

- **RIGHTS OF RESEARCH SUBJECTS**

If you have any questions about your rights as a research subject, you may contact the Regis University Institutional Review Board (IRB) by mail at Regis University, Office of Academic Grants, Denver, CO by phone at (303) 458-4206, or e-mail the IRB at irb@regis.edu . You will be given the opportunity to discuss any questions about your rights as a research subject with a member of the IRB. The IRB is an independent committee composed of members of the University community, as well as lay members of the community not connected with Regis. The IRB has reviewed and approved this study.

Appendix P

Evaluation of Progressive Simulation

Date: _____

Put and X in the appropriate column

Item	Agree	Disagree
I learned better working alone versus with a group		
I learned better without time limits on how long I could practice a skill		
I learned better by checking my own performance and deciding how many times to repeat my practice		
I learned better with progressive simulation versus task focused stations		

Comments:

What I liked best:

_____

_____

_____

_____

What I liked least:

_____

_____

_____

_____